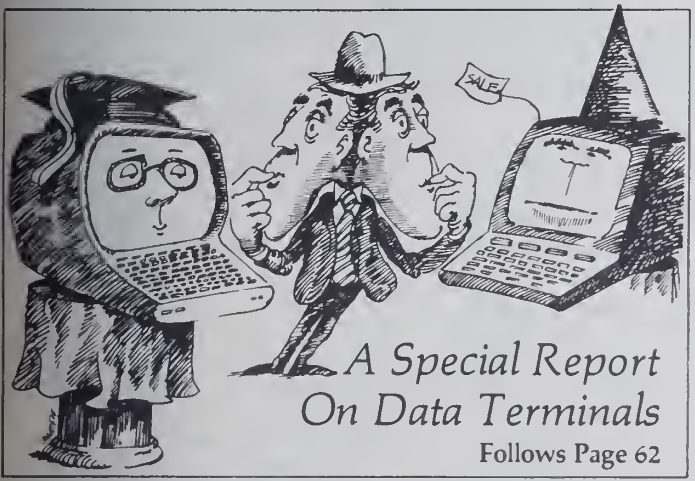
COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper Second-class postage paid at Framingham, Mass., and additional mailing offices © 1980 by CW Communications, Inc.

Vol. XIV, No. 13 March 31, 1980 $1.00 a copy; $30/year



A Special Report On Data Terminals

Follows Page 62

Managing People Effectively Spells DP Success: Keynoter

By Jeffry Beeler
CW West Coast Bureau

LOS ANGELES — Success as a DP manager depends less on technical expertise than on the ability to manage people effectively, the head of a local consulting firm said here last week.

DP managers who know how to get the most from their available personnel enjoy a higher level of departmental productivity and therefore advance their careers faster than their colleagues who have never learned the knack of effective staff management, according to Ira Gottfried, president of Gottfried Consultants, Inc.

Although hardware and software certainly play a major role in computing operations, the most important resource at a DP manager's disposal is still the staffers who keep systems running, Gottfried said as the Expo '80 conference and exposition began the second leg of its nine-city tour.

Whether a computing installation operates efficiently or poorly depends more than anything else on the productivity of its programmers, analysts and other personnel. But before such employees can perform productively, they must be motivated, and to motivate their underlings, DP managers first must understand what makes their staffers tick.

Modern-Day DPers

Today's computing room personnel differ significantly from their predecessors of 20 years ago, Gottfried said. Modern-day DPers have many more job opportunities, are much less likely to stand in awe of upper management and are much more technically specialized than the preceding generation of computing professionals.

They also keenly understand the value of labor, shun office politics, demand a materially pleasant working environment, expect their personal rights to be respected and are less loyal to their employers than to their profession, Gottfried said.

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Intelligent Terminals' Value Seen Hinging on Standards

By Brad Schultz
CW Staff

MIAMI BEACH, Fla. — Intelligent terminals may feature powerful microprocessors and dazzling display screens, but their value can vaporize if a user finds no way to link them with a host system.

The problem: inadequate standards, according to Lawrence Feidelman, president of Management Information Corp. (MIC). Expressing that view at Interface '80 here recently, Feidelman joined other speakers in calling for more standardization and systems compatibility in the world of DP.

A major advantage of terminals that store and run software is the potential for enhancing the productivity of nontechnical personnel, Feidelman said. But most current models lack a truly "clerical-oriented language."

That means managers seeking to extend on-line access in their organizations must either train office workers in DP skills or limit terminal availability to technical staffs.

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Used Computer Mart May Offer Bargains

By Marcia Blumenthal
CW Staff

Users who need more computing power now might find some attractive prices in the used computer market. It depends on what they need.

Although the demand for two- and three-year leases for used IBM 370/148, 158 and 168 equipment has been higher than ever, prices are low because supply is plentiful, according to Edward Cherney, president of CMI Corp., a third-party vendor.

"We have 148s and 158s coming out of the woodwork," he exclaimed last week.

A 148 is selling today for about 40% of IBM's list price of about $550,000, he said. A year ago, that same system cost 70% of IBM's then list price of $700,000.

Good deals are also available on 168 processors, according to Kenneth Pontikes, president of Comdisco, Inc.

A 168 Model 3, which Pontikes said is about as powerful as a 3032, now leases on a two-year plan for $25,000 to $30,000/mo. The 3032 is going for a monthly price of about $50,000.

Attached Processors

Another possibility some users may want to consider is a 158 or 168 with an attached processor (AP), Cherney suggested. Adding an AP to a 168 would cost about $11,000/mo and would provide a 60% to 70% increase in performance for about a 40% increase in cost.

(Continued on Page 6)

Banks Urged to Back EFT Privacy

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — As banks' computer systems become more and more widespread and complex, law enforcement authorities will demand more access to the information contained in them, a trend that can be forestalled only by the banking industry itself, according to a Senate committee attorney.

Describing law enforcement agencies, the Federal Bureau of Investigation in particular, as a "very powerful lobby," Jessica Josephson, counsel to the Senate Judiciary Subcommittee on the Constitution, said last week it is a constant struggle to restrain government access to financial information systems.

Addressing an Electronic Funds Transfer Association (EFTA) conference here Tuesday, Josephson said Congress will need the active support of industry to pass proposed EFT privacy legislation, slated for active consideration within the next few months.

The EFT bill, proposed last fall by the Carter Administration as part of its "privacy initiative," would provide specific legal avenues for federal and state law enforcement officials to gain access to personal EFT records.

The Senate bill and companion legislation in the House of Representatives cover all providers of EFT services, including DP and telecommunications. The legislation broadens consumer protections contained in the Right to Financial Privacy Act, signed into law a year and a half ago [CW, Oct. 23, 1978].

(Continued on Page 4)

Users Give IBM Disk Drives Top Marks

By Tom Henkel
CW Staff

DELRAN, N.J. — DPers are generally pleased with IBM-compatible disk drives, but users polled in a recent survey seemed to prefer IBM equipment.

Conducted by Datapro Research Corp., the survey was aimed at users of IBM 3350, 3340, 3330, 2314 and compatible disk drives. One hundred and twenty-nine users rated the drives in five categories: overall performance, ease of operation, hardware reliability, maintenance promptness and maintenance effectiveness.

Each product was scored on a four-point scale in which 4 represented excellent, 3 equaled good, 2 equaled fair and 1 represented poor. A weighted average was prepared in each category.

Memorex 3650 vs. 3350

In the 3350-compatible class, Memorex Corp.'s 3650 matched IBM's 3350 in overall performance with a 3.4 rating.

However, users said the 3350 is easier to operate and the hardware is more reliable than the 3650. The 3350 scored a 3.9 in ease of operation and 3.4 in hardware reliability compared with 3.6 and 3.2, respectively, for the 3650.

Users ranked Memorex's maintenance promptness higher than IBM's, but IBM's maintenance effectiveness higher than Memorex's. The IBM 3350 got a 3.0 maintenance promptness rating compared with the Memorex 3650's 3.2.

For effectiveness in maintenance Memorex scored 3.0 compared with IBM's 3.3. That lower rating is apparently a result of two Memorex users giving their vendor's maintenance effectiveness a poor rating, according to the survey.

Storage Technology Corp.'s (STC) 8350 scored lowest in the 3350-compatible class with a 3.0 overall per-

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Second-class postage paid at Framingham, Mass., and additional mailing offices PN127420. Published weekly (except: a single combined issue for the last week in December and the first week in January) by CW Communications/Inc. Copyright 1980 by CW Communications/Inc. All rights reserved. ISSN 127-420. Reproduction of material appearing in *Computerworld* is forbidden without written permission. Send all requests to Marion Kibbee.

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Computerworld can be purchased on 35 mm microform through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. *Computerworld* is indexed: write to Circulation Dept. for subscription information.

POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 375 Cochituate Road, Framingham, MA 01701.

Following DEC's Lead

Prime, DG Announce Price Jumps

By Tim Scannell
CW Staff

Like dominoes reacting to a light shove, two more minicomputer manufacturers followed the lead set a few weeks ago by Digital Equipment Corp. and announced price increases for their computer hardware and DP services.

Effective today, Data General Corp. said it will charge 5% to 10% more for certain CPUs, peripheral equipment, CRT terminals and communications interfaces. And next week Prime Computer, Inc. will raise the prices of its hardware 5%, boost the cost of its computer maintenance programs by an average 8% and hike the service fees for some of the firm's older equipment as much as 12%.

The Prime hardware affected by the 12% service increase includes the 300, 400 and 500 minicomputer systems. In addition, the purchase price of these machines will be raised up to 10%, a spokesman noted.

On the other hand, Prime's price hikes will not hit its 150 and 250 processors — the 150 is aimed at the OEM and systems builder markets. These two processors were introduced in January as budget versions of the company's 450, 550, 650 and 750 computers and were touted as carrying the lowest equipment price tags in Prime's eight-year history.

Similarly, DG's hardware increases do not cover the firm's Commercial Systems (CS) family, which includes a variety of processors ranging from the single-user CS/20 to the stand-alone or network-oriented CS/60 systems.

Some examples of the new DG prices are as follows: A Nova 4C minicomputer with 32K bytes of memory and a five-slot chassis that previously cost about $2,800 will now sell for $2,940. An Eclipse S250 with 64K bytes of core memory that used to sell for $30,000 will cost about $1,500 more.

Jumps Anticipated

A quick survey by *Computerworld* revealed that a number of older Prime machine users anticipated the hardware and maintenance price jumps.

Paul Salsgiver, a DP planning manager at Arcata National Corp. in Menlo Park, Calif., admitted that Prime's new fees will not have a tremendous impact on his firm's operation. Arcata deals in forest products, commercial printing and container manufacturing.

While the firm has both a Prime 400 and 500 processor, it also has a variety of IBM equipment installed at its central DP site and other corporate centers. So, because of Arcata's experience with IBM, executives there are "used to regular maintenance jumps," Salsgiver stated. "Like everything else, maintenance is labor-intensive."

Impact on DP Budgets

Still, a number of other users said that Prime's maintenance boosts would have an impact on their DP budgets.

Although Tom Hardman, a vice-president and DP manager at Colley, Gillespie & Associates in Fort Worth, Texas, was not yet aware of the price increases, he observed that the hikes might force the company to consider implementing its own maintenance plans "at some point in time."

However, the Texas-based petroleum consultant will stick with Prime equipment in the future, regardless of hardware hikes, since all of its software programs are "locked into" its Prime 400 mini, Hardman explained.

Both Prime and DG blamed the rising costs of material and labor, as well as the current state of the economy, for the recent price increases. Neither company would say that hardware, service and even software costs will not continue to climb.

But, like modern-day Robin Hoods, Prime and DG feel that their requests for more money are justified and ultimately fair to the user.

"There's a unique characteristic of this business," a DG spokesman pointed out. "That is that we sell products that fight inflation and improve productivity, which are the two biggest problems [the economy] has."

Beehive Hikes CRT Prices

SALT LAKE CITY, Utah — Inflation has forced a major terminal vendor here to hike prices for a smart terminal series by 10%.

Calling this the first price rise for its DM series of CRT terminals since the line debuted in 1977, Beehive International, Inc. said "increased costs associated with parts and labor have forced us to adjust prices for all new domestic and international terminal orders received after March 15."

Service contracts are unaffected.

This Week

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Ohio Medical Indemnity evaluates software...

Selects ADR's ROSCOE, LOOK and The LIBRARIAN.

Sorry about that, IBM.

ROSCOE selected over TSO and VSPC.

"When we converted from DOS to VS1, we wanted a replacement for CMS," explained Joe Petras, Technical Support Manager (left). "We couldn't use TSO because it wasn't supported on VS1. So we evaluated IBM's VSPC against ROSCOE and concluded that ROSCOE was by far the better product for our program development.

"Even though we've now converted to MVS and could switch to TSO, our programmers are very happy with ROSCOE and don't want to change. Besides, TSO would utilize about 24% of the CPU's capacity. The entire ROSCOE system uses only 4-6% of total CPU. We now do almost everything in the systems area through ROSCOE. Compared to our card environment, we see a probable productivity gain of 50-60%."

ROSCOE speeds MVS conversion.

Gary Hall, Director of the company's Data Center (right), commented: "IBM and others indicated that conversion from VS1 to OS/MVS would take from 3-6 months. Using ROSCOE, we converted in record time—six weeks."

LOOK tunes MVS system.

"We evaluated several performance monitors and concluded that LOOK was best suited for our needs," Mr. Petras said. "It gives us valuable information while using very little CPU."

"During our conversion to MVS, we used LOOK heavily to tune the system. Without LOOK, it would have been nearly impossible," added Mr. Hall. "We use it constantly to examine our environment—to improve response time and to evaluate requests for additional hardware and memory."

The LIBRARIAN pays for itself in six months.

"We've been able to put our libraries on 30 cylinders instead of 150," commented Mr. Hall. "And we no longer have to compress our test library. The LIBRARIAN should justify its cost in six months."

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Bill Waiting for Senate Action

House Says Yes to Paperwork Reduction Act

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The Paperwork Reduction Act of 1980, intended to streamline federal information practices and policies, has been overwhelmingly approved by the House of Representatives.

In a 328-13 vote, the House last Monday passed the measure introduced by Rep. Jack Brooks (D-Texas) Feb. 5 [CW, Feb. 18]. Similar legislation in the Senate has not been acted on.

Among other things, the Brooks bill calls for the creation within the office of Management and Budget (OMB) of a high-level Office of Federal Information Policy that would be responsible for all federal information practices, including government acquisition and use of DP resources.

Backers of the bill estimate its provisions for reducing the public's governmental paperwork burden could lead to savings of as much as $1 billion annually. Toward this goal, the legislation directs OMB to implement a governmentwide, on-line "federal information locator system" to promote agency information-sharing [CW, March 3].

The legislation incorporates recommendations of the President's federal DP reorganization project and the Commission on Federal Paperwork. Congressmen Frank Horton (R-N.Y.) and Tom Steed (D-Okla.), chairman and member, respectively, of the paperwork commission, cosponsored the Brooks bill.

Industry Reservations

The legislation received strong backing from federal officials who testified during the several days of hearings held on the proposal by Brooks' Legislation and National Security Subcommittee. Some members of the DP industry, however, have expressed reservations about the bill.

The legislation would increase the authority of OMB, and to a lesser extent, the General Services Administration to set governmentwide policies for DP procurement and use. Some in the DP industry have openly criticized the past performance of these two agencies in exercising their power over government DP.

Although no great opposition to the Brooks bill has surfaced in the DP community here, there have been grumblings about what some see as a lack of opportunity for industry to comment on the proposal and about the speed with which it moved through the House.

Introduced in early February, the bill was approved by the Brooks subcommittee March 4 after a few days of hearings. After minor amendments, the full Government Operations Committee sent the bill to the House floor less than two weeks later.

Human Skills Key to Manager's Success

(Continued from Page 1)

An acute shortage of skilled computing personnel has made the "new breed" of DP professional a high-demand item and has resulted in "tremendous" staff turnover rates. At any given moment, an estimated 20% of all DP staffers are circulating their resumes, he said, and another 45% are planning to do so eventually.

Yet in most cases, a DPer's reason for changing positions has nothing to do with salary. Although today's typical computing-room staffers hold money and material possessions in high regard, they care even more about job satisfaction and congenial working conditions, Gottfried said.

They want a job that will challenge them, give them an opportunity to use their competence, keep them productively busy and provide an avenue for professional growth. They also want a working environment free of excessively tight deadlines, extreme pressure and irritable coworkers.

Motivation Opportunities

Effective DP managers know how to recognize an employee's occupational "likes" and "dislikes" and have learned how to use that knowledge as opportunities for motivation.

Knowing, for example, that staffers like to feel involved in their organizations, a good DP manager will invite each employee to participate regularly in departmental planning and policy discussions, Gottfried said. In so doing, the manager plays upon the subordinates' desire for involvement and thus motivates them to boost their productivity.

Other techniques DP managers can use to increase productivity include:

- Helping employees chart their career paths.
- Periodically asking their staffers to define their professional goals.
- Organizing group recreational activities.
- Occasionally providing show tickets, extra days off and other inexpensive rewards for a job well done.

Banks Urged to Support EFT Privacy

(Continued from Page 1)

According to the Administration proposal, law enforcement agents would need a court order to acquire EFT records or to intercept EFT transmissions. Anyone whose records are being sought would be given advance notice and could have the opportunity to challenge the request for access to his records.

Improper disclosure of EFT records would be punishable by a fine of up to $100,000 and five years in jail. And failure to follow the bill's provisions would make the government liable to a civil suit by anyone whose EFT records were unlawfully disclosed.

Describing the legislation as "very broad," Josephson said "it's not a perfect bill right now and it's going to go through some drafts." She urged the banking industry to offer suggestions.

Working Relationships

Unless Congress is made aware of how the financial industry perceives its relationships with law enforcement, the FBI and other agencies will have great influence on how the legislation is finally structured, she said.

"The bureau always says they have great working relationships with the banks," according to Josephson, and the Judiciary Committee has little information from the banking industry to suggest otherwise.

Participants at the EFTA conference, however, described their associations with the FBI as characterized by intimidation and, in the words of one conference attendee, "terror."

If it does not want to continue to be terrorized, "the industry has got to safeguard themselves," Josephson said. Curbing the FBI is not a popular idea in Congress right now, she said, and asked the industry for ammunition to carry on that battle.

The committee has documented abuses of bank records privacy by law enforcement agencies but has no such data on EFT record privacy, she said. "We need to know if there is a problem, if there is government harassment."

FBI Opposition

Josephson said the FBI had tried to have the financial institutions privacy law amended "to weaken it and gut it" because the bureau does not want to go to the trouble of obtaining a court order to gain access to personal financial records.

She said she expects even more opposition from the FBI on the proposed EFT privacy bill. Under the bill, the bureau is "going to have to go through a full song and dance" to obtain the necessary court order, and the bureau is not going to like it, Josephson said, terming it "a fight we've had with all law enforcement."

Law enforcement agencies "will surely get their way with Congress" unless the financial industry pressures Congress, she said.

Josephson noted that more and more financial transactions are being automated and the use of computers is becoming more widespread in the financial industry. Given that trend, law enforcement pressure to gain more access to computerized financial records will only increase, she said.

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Users Getting Ready for Nine-Digit Zip Code

By Jay Woodruff
CW Staff

Large DP operations with sizable numbers of mailing addresses on their systems are beginning to take the steps needed to comply with the U.S. Postal Service's (USPS) call for voluntary implementation of a nine-digit Zip Code.

The longer Zip, announced in September 1978, is billed by USPS as a way to improve service. It also promises to save money for large volume mailers, although most users are not sure what the real savings will be.

The proposed nine-digit Zip Code will add four numbers to the present five to help automate the routing of mail to individual streets, buildings and businesses within Postal Zones. It is expected to be implemented in less than 11 months [CW, Feb. 18].

Don Kirkendall, an officer at the USPS Office of Zip Code Expansion, said the post office has finished assembling the codes for five cities — Hartford, Conn., Harrisburg, Pa., Baton Rouge, La., Lincoln, Neb., and San Jose, Calif. Selected large bulk mailers in those cities will receive test tapes in July to match against their current mail listings and will report to the post office how well they work.

While the final form of the tapes has not yet been determined, Kirkendall said it is now based on the Carrier Route Information System (Cris) tapes, which are available for third-class bulk mail presorting.

Some users have expressed concern that the Zip Code field will actually have to contain 10 characters if they must accommodate a dash after the first five digits. The dash was put into the code to help persons working on sorting machines to route the mail, but Kirkendall said DPers will not be required to put it into their codes.

Users contacted by *Computerworld* are greeting the news of the expanded code with some resignation, some evidence of preparation for the code and some requests that the post office make available more information.

One user, Jim Gilliam, management information systems consultant at B.F. Goodrich Co. in Akron, Ohio, is not enthused about the work his firm must do to handle the nine-digit Zip Code. "We have not sat down and figured how much this will cost us. We have so much to look through, and such a conversion doesn't add anything to the worth of the system here," he said.

Goodrich is a multidivisional company and carries the majority of its files in either IBM's IMS or Cullinane Corp.'s IDMS data base management system. However, a large portion are still contained in tape or disk files on older equipment.

"Some of our computer systems are 15 years old and some are 15 days old. One does not know without looking through the files which have codes that will have to be changed," Gilliam said, so the firm must be prepared to take steps to convert on all fronts.

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Extra Digits No Mean Feat

By Jay Woodruff
CW Staff

DOWNEY, Calif. — What is involved in converting from a five-digit to a nine-digit Zip Code in a very large DP shop? Well, big numbers are certainly involved.

One big number is the 3,000 to 4,000 programs — out of a total of 8,500 — that the County of Los Angeles will have to change in its DP facilities here. Another big number is $2 million, which is somewhat less than Edgar Hayes, the county's director of DP, thinks it will cost to expand all of the Zip Codes needed in the course of running its IBM 370 applications.

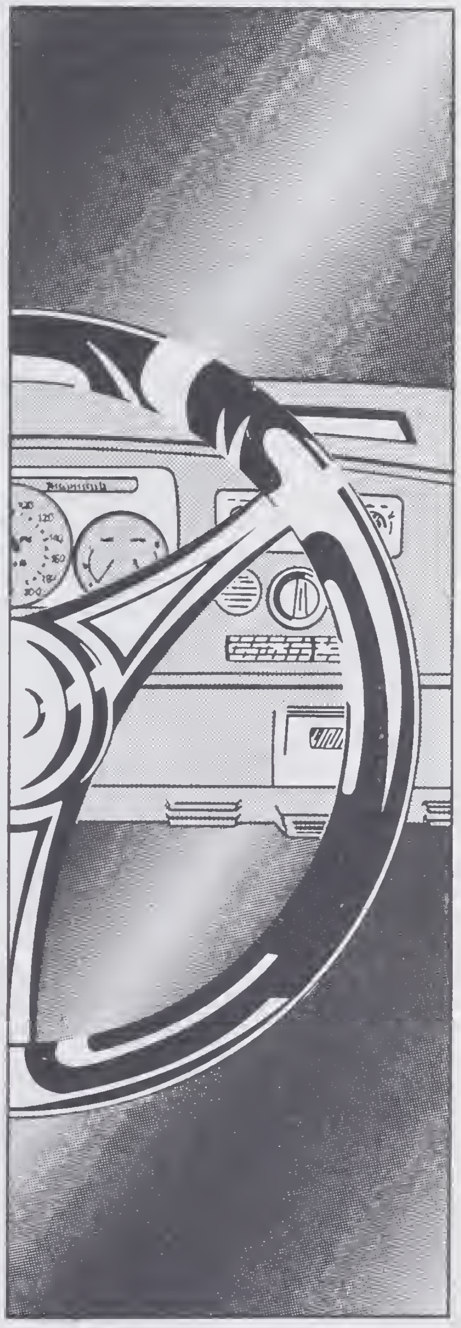
Although he cannot tell exactly how many address files have to be changed and therefore could not give more than a rough estimate of the conversion cost, Hayes said the county makes multimillion-piece mailings throughout the year:

- The facility maintains files on 2.1 million property parcels. One of the major applications based on those files is a tax mailing.
- More than three million voters are registered here; every person in those files receives pamphlets and notices a number of times before an election.
- About 3.6 million patient records are kept on people who have been treated in hospitals and clinics here over the years, although most records are for patients who have long departed.
- And the county maintains four million records on welfare recipients, of which about one million are active.

"In the law enforcement area, we have 2.5 million records. These are of criminal histories which are used for a number of applications. We carry information on personal histories, event information and so on. And we carry records on moving traffic citations — one million of them," Hayes said.

Hayes would not mind committing manpower and money to the conversion if it can net him some clear savings on the millions of mailings, but he does not know just what mailing costs the U.S. Postal Service can save him.

The director of what some people think might be the largest DP shop in the U.S. said he would appreciate specific details from the post office on what will be involved in the change and how large mailers can expect to benefit from it.



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DP Nothing New for Capitol Hill Lawmakers

By Marguerite Zientara
CW Staff

CAPITOL HEIGHTS, Md. — While it may seem that politicians have increased their use of computers dramatically during this election year, this is not the case. Many Capitol Hill lawmakers have been taking advantage of computing technology for years to keep up with their constituencies and keep themselves in office.

Many are using the services of direct-mail firms. For example, the direct-mail consulting firm that is maintaining the contributor files for Presidential contender George Bush [CW, Jan. 28] has similarly served both incumbents and hopefuls on the Hill since 1972.

"In election and nonelection years both, we have congressional accounts, primarily for the purpose of constituent list maintenace and mailing," according to Dan Harris, general manager of the Computer Services Devision of Creative Mailing Consultants of America, Inc.

"And obviously in election years we try to expand into doing their financial reporting packages — for the Federal Election Commission — and fund-raising packages for them and for other clients as well," he added.

Political Clients

Besides philanthropic organizations and consumer mail response companies, Creative Mailing has "about 20" political clients as customers at any one time, Harris estimated.

In addition to Presidential contenders, "we get clients running for office anywhere from state attorney general all the way to U.S. senator," he noted. "Anybody who's running for office can use our services, quite frankly."

There are also one-shot jobs for political clients, he explained. "There may be another 50 or so at any one time who need just one job run, so you run it and there's really no other association with that organization or that person," he said.

While the company deals with both Republicans and Democrats, "I guess in general we have found that Republicans tend to mail more" than Democrats, Harris observed.

While Creative Mailing communicates over telephone lines with the George Bush direct-mail fund-raising campaign's IBM System/6 word processor in Houston, local users do not yet have on-line access to the firm's IBM 370/115 and 370/135.

Such a system is in the works, however, aimed at "the new Congress" to be voted in next fall, acording to Tom Smith, Creative Mailing's director of marketing.

Now being tested by Rep. Stephen Neal (D-N.C.), the system depends on an IBM 3275 terminal located in the user's office, allowing direct access to the user's own data base maintained by Creative Mailing.

And while the firm produces letters in-house on both a System/6 and an IBM 6670 laser printer, the company is now developing remote communications between users' System/6s and the firm's own computers, Smith explained.

"We maintain the data base on the 370, then the user selects a letter format, and a correspondence-quality letter will be produced on-site by the user's System/6," Smith explained.

Communication Capability

"We're the only firm we know of in the Washington area that can communicate a large mainframe computer with the IBM System/6 for clients," resulting essentially in increased capability for the Sytem/6, Smith claimed.

Smith discovered the need for such communication by "snooping around the Hill," he said. "They love the System/6 [on the Hill], but the trouble is, they can't keep large data bases on it.

"Most congressional offices have over 100,000 names that they want to maintain for correspondence with the constituents," he noted. "It's almost impossible to keep track of 100,000 names on a System/6.

"Delving into the area, we started writing software that allows users to pass names back and forth between the System/6 and the 370," he said. "The System/6 is actually at users' sites on the Hill, but we maintain the data base here," he explained.

These capabilities combine to tackle "undoubtedly the most essential, but time-consuming, task of an effective office staff on Capitol Hill," according to Creative Mailing's literature — namely, "communication between the [congressional] member and [his] constituents."

Other equipment in Creative Mailing's all-IBM configuration includes one 3803 tape control unit, eight 3420 magnetic tape drives, two 3410 magnetic tape drives and a 3411 tape contoller and drive. The 370/135 has 512K bytes of memory and the 370/115 has 192K bytes.

In addition, the firm maintains a 3674 storage control unit, a 3643 disk module and contoller with 140M bytes and a 3640 disk module with 140M bytes of memory. There is also a 3505 card reader and 3525 card punch.

A 1,200 line/min Model 3203 printer, two 1,100 line/min 1403-N1 printers and two 2821 printer control units are also part of the installation. One CMC-4E remote terminal controller and a 3272 local terminal controller round out the configuration.

Teachers Get DP Institute

AMHERST, Mass. — High school and college teachers of computer science and DP can choose from five courses at this year's National Computer Education Institute, to be held here June 8-20 and Aug. 3-15 at Oklahoma's Central State University.

The five courses are Data Base Processing Systems, Structured Cobol Programming, Advanced Structured Cobol Programming, Structured Basic Programming and Microcomputer Systems With Pascal. Special workshops will also be held.

More information is available from Dr. Joe M. Kinzer, Central State University, Edmond, Okla. 73034.

Used CPU Market May Offer Good Deals

(Continued from Page 1)

As for 30 series mainframes not only are they expensive, they are also hard to find, he added. But the time is ripe for users who have been amassing rental credits on four-year lease plans to buy those machines, sell them to a third party and, in turn, rerent the same machine on a MAC plan.

However, a user, on a four-year plan with IBM expecting delivery of another machine, could be hit with a stiff penalty by IBM for canceling before the lease expires. IBM's penalty currently is 25% of the remaining value of the lease contract, Cherney said.

In the case of peripherals, prices for equipment like IBM 3350 disk drives are high and going higher because supplies are limited, Comdisco's Pontikes said.

Right now a 3350 is priced at 80% of IBM's present list price. Last year, by comparison, the same gear was selling at 60% of IBM's price.

Richard Forsythe, president of Forsythe McArthur Associates, Inc. pointed out that while demand for peripherals is high overall, some users are moving away from certain brands of IBM-compatible gear.

For example, demand for Memorex Corp. and Storage Technology Corp. equipment is still strong, but users are avoiding products from companies like California Computer Products, Inc., which sold off the peripherals portion of its business a while ago.

Typical Shopper

Who's shopping the used market these days? Basically, it's a user who's looking for a fully loaded system with lots of memory and lots of peripherals, CMI's Cherney said.

Unlike last year, a typical user who is trading in a 370/148 with 512K bytes of memory now wants a 158 with "air conditioning, power steering and radio," he quipped. Users with these needs will have to deal with large third-party vendors to fulfill their requirements.

Many third-party vendors are beginning to have liquidity problems, Forsythe noted, adding that because of the high cost of money they are reluctant to borrow to finance inventory.

Forsythe said his firm is beginning to take orders first and then acquire equipment to fill these orders.

Though money can still be saved in the third-party market, that may not always be the case, "Sonny" Monosson, president of American Computer Group, Inc. suggested.

In months to come, the traditional third-party leasing business may become a thing of the past, Comdisco's Pontikes agreed. Lessors may have to require more full payout leases in order to make a profit, thus reducing the possibility of significant savings on equipment.

IBM on the other hand, is its own bank, Monosson noted. It was smart enough to borrow a lot of money at 9.5%, which it can use to finance leases, whereas third-party companies' payments to financial instituations are generally tied to the prime rate, now approaching 20%, he said.

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Users Readying Conversion To the Nine-Digit Zip Code

(Continued from Page 5)

Although B.F. Goodrich has not decided just how it will accommodate the expanded Zip Code, it could use restructuring tools under IDMS to modify the Zip's field size. When the post office makes magnetic tapes of the nine-digit codes available early in 1981, it will be necessary to put together an algorithm or buy software to accomplish the replacement of the present five-digit code, Gilliam said.

But no matter what must be done to make the conversion, Gilliam is unhappy with the prospect of spending so much time on a project that will not improve the performance of B.F. Goodrich's DP systems. "It's just another thing you have to go through that doesn't allow you to use the system any more effectively — a totally nonproductive thing," he lamented.

'Fortuitous' Announcement

At Combined Insurance of America in Chicago however, the announcement of the expanded Zip Code was labeled "fortuitous" by Assistant Director of DP Art Tuckman. "We're contemplating a change in our data base address structure and plan to include space for the nine-digit Zip — although we are not sure how we are going to make the change," he said.

Combined Insurance carries a total of 7.5 million accident, health and life policies; 70% of them are held by U.S. policyholders. "We're providing space on our records, but I'm not sure how we're going to implement the code because we'd need to know more about it from the post office. Once the information is available, we can make a judgement on how to do it and how long it will take," Tuckman said.

At European-American Bank, a Westbury, N.Y.-based holding company for the European-American Banking Corp. and the European-American Bank and Trust Co.,Jim Morley, the vice-president in charge of systems, would like to "ignore [the nine-digit Zip Code] as long as possible and hope that it won't go through."

It is easy to expand the field for the additional four numbers of the code, he said, but not so easy to figure out how to assign the new Zip Codes to the current addresses. "We use Cullinane's IDMS. It is relatively simple to expand to nine numbers. The problem is that much of our mailing addresses would have to be set up again in mass mailing applications for statements, advertisements and the like.

"We have about 250,000 addresses to work with. At least each address appears only once in a data base," Morley noted.

Packaged Help

At Auto Owners Insurance in Lansing, Mich., Don Aper, assistant vice-president of data services, may work with a software house that sells a Zip Code program. Meanwhile, the user is leaving space for the nine-digit code as it converts its applications files.

"The List Processing Co. [located in Addison, Ill.] worked with us before to help do our Zip Codes. We may work with it to convert to nine digits," Aper said.

Any conversion would involve changing approximately 1.25 million addresses. "We haven't given it much thought, but we are leaving space as we move toward implementing it," he noted.

According to the USPS' Kirkendall, it is still a bit early to see how the expanded Zip Code will affect users, except that it will help retard rising costs. The Postal Service is working on a publicity campaign to educate users on what will be involved in the change and how it will benefit them.

"There will be enough benefits to make it worth their while to use it, in my opinion," Kirkendall maintained.

Opel to Fill Cary Post As IBM Chief Executive

ARMONK, N.Y. — IBM ended the speculation over a successor to Frank T. Cary as chief executive officer last week with the announcement that John R. Opel will fill that slot. Opel, 55, has been president of the firm since 1974.

Cary will remain as chairman, although he announced several weeks ago that he would step down as chief executive around his 60th birthday this December [CW, March 10].

Because a successor for that top operational post was not named when Cary announced his retirement, many had speculated that IBM was in for a management shake-up — particularly because last year it announced its first year-to-year earnings decline in almost 30 years.

However, by picking Opel — who has been with IBM since 1949 — the firm followed the traditional road. Opel, who started as a sales representative in Jefferson City, Mo., first became a vice-president in 1966.

Cary, chief executive since 1973, had a seven-year run at the post, but Opel's reign will probably last only five years because the firm has a "tradition" of chief executive retirement at age 60.

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User: Desktop Units Great For One-Time Problems

By Jeffry Beeler
CW West Coast Bureau

LOS ANGELES — One of the main advantages of owning a desktop computer lies in the product's ability to help its users solve business problems that seldom if ever repeat theselves, a financial executive for a frozen seafood distributor said here last week.

Large-scale mainframes and full-fledged minicomputers are well-suited to providing answers to management questions that arise every day, but what about the many business problems an executive encounters only once during his lifetime? For the latter type of problem, a desktop computer can prove an invaluable management and financial tool, according to Fishking Processor, Inc.'s controller, Victor Deutsch.

With a minimum of training and practice, even a computing novice can learn to write impromptu programs to unsnarl quirky, one-of-a-kind business snags, Deutsch said during the Southern California edition of the Computer Expo'80 conference and exposition.

A Prize of a System

Detsch based his assertion on his own experience with a desktop computer he won almost two years during a raffle at the National Computer Conference in nearby Anaheim. With the system—-an 8K-byte Wang Laboratories, Inc. PCS-2—the Fishking executive routinely writes special programs to verify his firm's accounts payable, prepare appreciation schedules, do supplementary payroll computations and perform other financial tasks not typically assigned to the company's service bureau or its main, in-house processor.

"The desktop computer has replaced my adding machine and calculator, but the system can do many things a typical adding machine can't," Deutsch explained. "For example, I can use it to program three or four levels of totals or relate several sets of data to each other."

But for all its valuable capabilities, Deutsch's personal computer would have remained all but useless if the Fishking executive had not learned to use it effectively. A desktop system, no matter how flexible or technologically sophisticated, is only as good as its owner's skills as a programmer and operator, he said.

Fortunately for Deutsch and other nontechnical executives like him, the intricacies of small personal computers usually prove fairly easy to master. Deutsch found he could learn to program his own system with only a little hands-on experience supplemented by three to four hours of reading from a beginner's programming manual.

In his first tentative outings as a programmer, the Fishking financial executive made a few mistakes; with practice, however, he quickly learned to spot his errors and rewrite his code accordingly.

"Teaching yourself to program a desktop computer is like anything else," he said. "There's a learning curve, but you quickly get the hang of it."

Today, Deutsch said he can program his desktop computer in Basic with a "fairly high degree of sophistication," even though his only previous exposure to computing came during a programming course he took 15 years before winning the system.

Deutsch uses his PCS-2 configuration, which comes with 65K-byte floppy diskette units, primarily as an adjunct to his firm's main processor, a 16K-byte Wang 2200T minicomputer.

The larger system holds some 40 data files and 200 programs to perform order entry, accounts receivable and inventory control for Fishking's nationwide network of public warehouses.

The central mini's custom-written software combines selected elements from several existing packages and allows the system to operate without a trained programming staff. All the CPU's data entry, for example, is performed by typists who mastered their new jobs as computer operators in about 30 days, Deutsch said.

Management Skills Addressed

BETHESDA, Md. — Users who are interested in developing their skills at managing people and who must sell top management on the need for a sound human resources management program may wish to consider some new educational packages from Gary Slaughter Corp.

Slaughter, who was president of Brandon Systems Institute, Inc. until recently, has formed his own company to offer a Career Structures Package and a Performance Appraisal and Counseling Program. The first defines all positions in a DP organization, including job titles, tasks and levels of proficiency. The latter provides a two-way feedback between employee and employer, Slaughter said.

Together, the packages reportedly address the problems of turnover, recruiting, morale, productivity, salary policy, job descriptions, career development and training in a DP department.

More details are available from Slaughter at 4810 Montgomery Lane, Bethesda, Md. 20014.

Standards Vital to Intelligent Terminals

(Continued from Page 1)

The MIC president called on vendors to equip intelligent terminals with a high-level language similar to Cobol that most white-collar workers could readily adopt. Businesses certainly want tools like data terminals that allow professionals to accomplish more on the job, he noted.

Terminal vendors can therefore rake in large orders if, by featuring the right software, their products gain large acceptance within most companies, he pointed out.

Such software should support word processing and text editing, according to James R. Folts, marketing vice-president of Syntrex, Inc. Office applications of intelligent terminals will include message switching and report generation as the trend toward integration of DP, word processing and telecommunications technologies continues.

Office environments also demand compactness, Folts said, noting that office space now costs $30/sq ft. in Washington, D.C. In the 1980s, users will want their terminals, including hard-copy facilities, to mount on desktops as replacements for typewriters.

In terms of computing power and memory capacity, the most sophisticated terminals are veritable minicomputers, another speaker suggested. Before long, terminals based on 16-bit and 32-bit microprocessors and offering 64K bytes of memory will reduce dependence on host mainframes in decentralized networks.

Some models will offer several microprocessors — a single 16- or 32-bit micro to run major software and additional smaller micros dedicated to special functions like I/O handling, Kenneth B. Hanley of Codex Corp. explained. Mid-range minicomputers typically feature 16-bit word sizes, while 32-bit words are common with mainframes and the so-called superminis.

Obsolete Distinction

The growing power of interactive data terminals makes the popular separation of such devices into two classes — "smart" and "dumb" — rather obsolete, Hanley indicated. A number of schemes for classifying microprocessor terminals now circulate, he said.

Many vendors distinguish between a merely smart terminal, which runs software written by the vendor, and an intelligent terminal, which is user-programmable.

Since intelligent terminals typically execute both vendor-and user-written software, they may be called smart, but users cannot program many smart terminals, which are thus not intelligent, Hanley explained.

The distinction between intelligent terminals and small business systems gets murky in both directions, Feidelman told the session. From the standpoint of the terminal arena, intelligent units may be competing with models of small business systems for berths in some decentralized networks.

On the other hand, some user may consider implementing commercial microcomputers as intelligent terminals by adding a modem and the appropriate interfaces.

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Before Pursuing $500 Million Upgrade

GAO Tells the EPA to Clean Up Its DP Act

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The Environmental Protection Agency (EPA) should clean up management of its information and DP resources before pursuing a planned half-billion dollar computer upgrade, according to the General Accounting Office (GAO).

In a report issued earlier this month, the GAO said that because EPA is "an information-intensive agency," its information resources are critical to all its program activities. The agency, whose responsibilities include enforcing standards for air pollution emissions, water quality, pesticide use and noise levels, reserves nearly 20% of its budget for collecting, processing and analyzing data.

EPA has about 50 "major computer-based information systems," GAO noted, and relies on two major computer centers, minicomputers in regional offices and laboratories and a nationwide telecommunications network serving some 3,000 users throughout the country.

In 1979, EPA spent almost $16 million to operate this network, centered on its two computer installations, one located here and the other in Research Triangle Park, N.C. Through the 1980s the agency plans to spend up to $50 million annually for its DP resources and expects to replace its entire system, beginning in 1985, at a cost of about $500 million over a 10-year period.

Present Management

As ambitious as its future DP plans are, the agency has not been able to provide adequate management for its present information resources, GAO said. EPA problems identified in the report included:

- Little top management involvement.
- Lack of strong central management or direction of computer-based systems.
- No mechanism to coordinate planning.
- Lack of a nucleus of DP professionals to support system development to assist offices lacking DP experience.

Although the GAO commended EPA's establishment of a steering committee of top-level managers to review the problems and noted the agency has moved to initiate corrective measures, the congressional auditors recommended that more is needed and suggested EPA establish a "central information resources management office."

Problem Areas

The basic problem this office would tackle, GAO said, is that the agency's lack of effective management and technical direction is resulting in "late delivery of system products, low quality of these products and cost overruns."

EPA has had additional problems in dealing with the contractors who provide much of the agency's DP support, GAO said.

The report noted an absence of a focal point for system development within the agency, "scattered project managers not adhering to standards in contract management" and little technical and managerial training and experience among EPA project officers.

Inadequate Planning

The agency should correct these problems before proceeding with its DP upgrade, a project that is already troubled by lack of proper planning, according to GAO.

The agency "has not adequately justified the need for this additional computer capability," GAO said, giving as examples the fact that "the workload forecast is inadequate and unused computer capacity exists."

But the agency is moving ahead with its upgrade plan even though "adequate steps have not been taken to manage the existing work load," GAO complained.

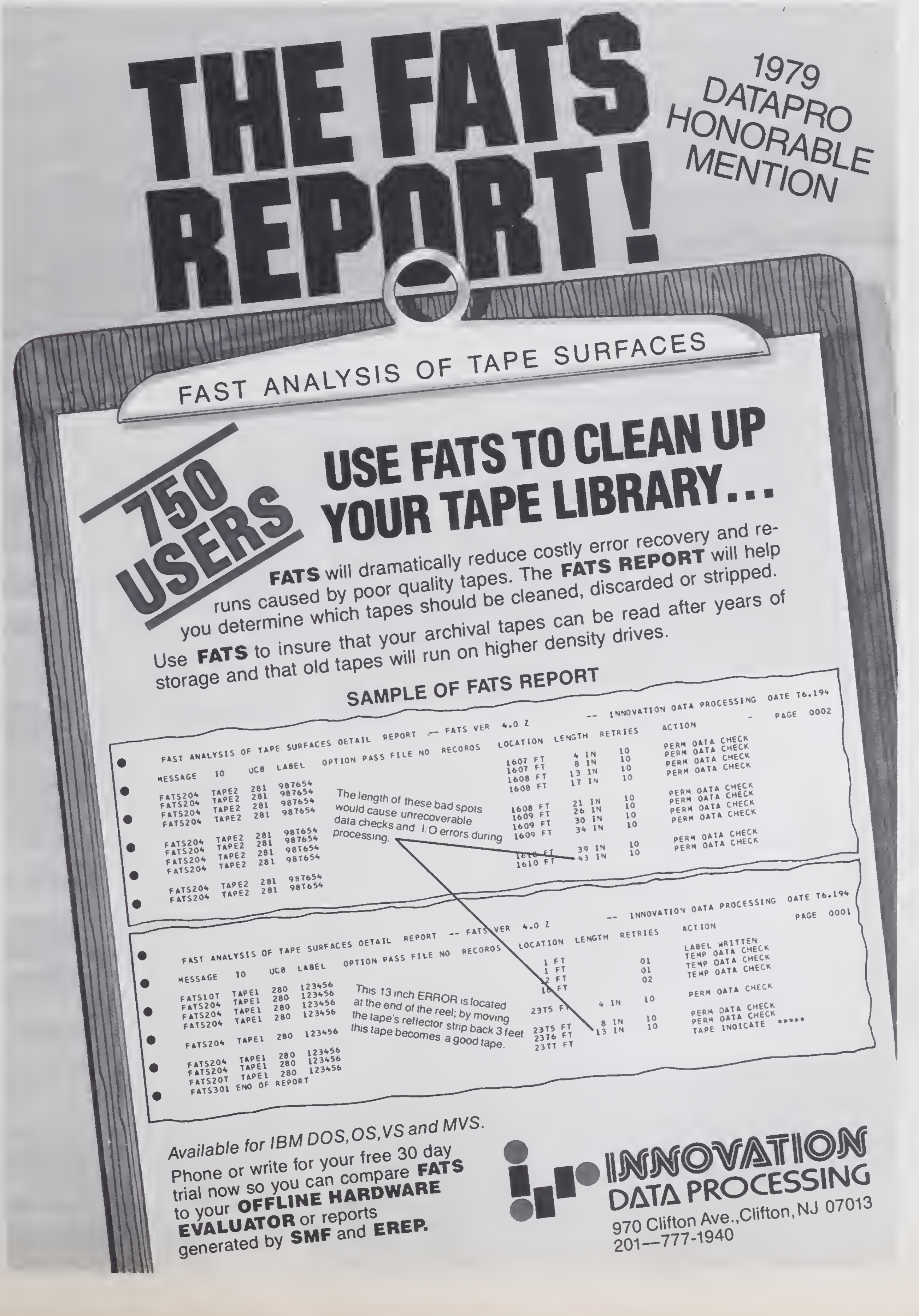
Cost Analyses

The report further noted that "EPA has already committed itself to consolidate its two computer centers in North Carolina although it has not completed any cost studies to demonstrate the benefits of consolidation.

Cost analysis difficulties are behind much of the agency's problems, the report added. EPA is not using full-costing techniques, is not including full costs in its chargeback to central computer users and has therefore substantially understated the cost of providing central computer resources."

EPA budgetary policies tend to encourage inefficient use of DP resources, the report explained, noting that "because accountability has not been assigned to computer system users, they are generally unconcerned about the cost of data center services." This has resulted in some users' thinking the computer services are free, according to GAO.

Part of the reason these problems still exist five years after first being identified is that top EPA management has not provided enough support for agency auditors to conduct the periodic audits needed to assure that DP resources are effectively used, GAO said.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MESSAGE    IO     UC8  LABEL    OPTION PASS FILE NO  RECOROS   LOCATION  LENGTH  RETRIES   ACTION
FATS204   TAPE2   281  987654                                  1607 FT     4 IN     10     PERM OATA CHECK
FATS204   TAPE2   281  987654                                  1607 FT     8 IN     10     PERM OATA CHECK
FATS204   TAPE2   281  987654                                  1608 FT    13 IN     10     PERM OATA CHECK
FATS204   TAPE2   281  987654                                  1608 FT    17 IN     10     PERM OATA CHECK

FATS204   TAPE2   281  98T654                                  1608 FT    21 IN     10     PERM OATA CHECK
FATS204   TAPE2   281  987654                                  1609 FT    26 IN     10     PERM OATA CHECK
FATS204   TAPE2   281  98T654                                  1609 FT    30 IN     10     PERM OATA CHECK
FATS204   TAPE2   281  98T654                                  1609 FT    34 IN     10     PERM OATA CHECK

FATS204   TAPE2   281  987654                                  1610 FT    39 IN     10     PERM OATA CHECK
FATS204   TAPE2   281  98T654                                  1610 FT    43 IN     10     PERM OATA CHECK
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The length of these bad spots would cause unrecoverable data checks and I/O errors during processing.

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                                                                -- INNOVATION OATA PROCESSING  OATE T6.194
FAST ANALYSIS OF TAPE SURFACES OETAIL  REPORT  -- FATS VER  4.0 Z                                  PAGE  0001
MESSAGE    IO     UC8  LABEL    OPTION PASS FILE NO  RECOROS   LOCATION  LENGTH  RETRIES   ACTION
                                                                                           LABEL WRITTEN
FATS10T   TAPE1   280  123456                                     1 FT              01     TEMP OATA CHECK
FATS204   TAPE1   280  123456                                     1 FT              01     TEMP OATA CHECK
FATS204   TAPE1   280  123456                                     2 FT              02     TEMP OATA CHECK
FATS204   TAPE1   280  123456                                    16 FT
                                                                23T5 FT      4 IN   10     PERM OATA CHECK
FATS204   TAPE1   280  123456
                                                                23T5 FT      8 IN   10     PERM DATA CHECK
FATS204   TAPE1   280  123456                                   2376 FT     13 IN   10     PERM OATA CHECK
FATS204   TAPE1   280  123456                                   23TT FT                    TAPE INOICATE  *****
FATS20T   TAPE1   280  123456
FATS301   ENO OF REPORT
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Users Rate IBM a Tough Match for Disk Drives

(Continued from Page 1)

formance rating. Low ratings in hardware reliability seemed to have lowered the overall performance rating; the drive scored a 2.8 in hardware reliability.

However, it scored higher than both Memorex and IBM in maintenance effectiveness with a 3.5. STC's maintenance promptness also came in higher than IBM's with a 3.3 compared with IBM's 3.0.

The 8350 rated 3.3 in ease of operation.

In the IBM 3340 class, Memorex's 3640 drive scored high in all categories. It received 3.8 for both overall performance and ease of operation, 3.6 for hardware reliability and 3.5 for both maintenance promptness and effectiveness.

A rating of the IBM 3340 was not available because Datapro did not get at least three user responses on it.

The 3330 Class

In the 3330-compatible market, California Computer Products, Inc. 235 double-density drive (now marketed by Braegen Corp.) and Memorex's 3675 double-density drive, with 3.5 each, came closest to IBM's 4.0 overall performance.

IBM's 3330 was also rated excellent in hardware reliability and maintenance promptness. It garnered high 3.7 scores in both ease of operation and maintenance effectiveness.

The Braegen 235 scored low in maintenance promptness and effectiveness with 3.0 and 2.8, respectively. The 235 received 3.5 rankings in ease of operation and hardware reliability.

Memorex's 3675 double-density drive scored slightly higher (3.8) than IBM (3.7) in ease of operation. It scored lower on all other counts with a 3.4 in hardware reliability, 3.2 in maintenance promptness and 3.5 in maintenance effectiveness.

Telex Computer Products, Inc.'s 6316 scored high in ease of operation (3.8) and low in maintenance effectiveness (3.0) to give it an overall rating of 3.4. Low maintenance scores for Memorex's 3670 single-density drive also lowered its overall 3.4 rating — it got 2.9 in both maintenance promptness and effectiveness and 3.2 in hardware reliability. In ease of operation, however, it scored 3.8.

NAS Drive Rated Low

National Advanced Systems' (NAS) 7330 drive was rated poorly in all classifications. With a 2.9 overall performance rating, the unit scored 3.3 in ease of operation, 2.1 in hardware reliability, 2.7 in maintenance promptness and 2.3 in maintenance effectiveness.

In maintenance for the 7330, eight of 20 users responding to the survey rated effectiveness as poor and five said hardware reliability was poor. Three users gave the NAS offering a poor overall rating.

Low maintenance ratings may be a result of the recent transfer of the troubled Itel Corp.'s DP division to NAS. Poor hardware reliability ratings, however, cannot necessarily be attributed to the Itel-NAS exchange, Datapro said.

Control Data Corp's 33301/33302 scored low in all categories with 3.3 overall performance and ease of opera-

(Continued on Page 11)

USERS' RATINGS OF DISK SUBSYSTEMS

Disk Subsystem	Number of User Responses	Number of Drives Represented	Weighted Averages and Response Counts*																								
			Overall Performance					Ease of Operation					Hardware Reliability					Maintenance Service									
																		Promptness					Effectiveness				
			WA	E	G	F	P	WA	E	G	F	P	WA	F	G	F	P	WA	E	G	F	P	WA	E	G	F	P
IBM 2314 Replacements--																											
Control Data 23121 '23141	3	34	4 0	3	0	0	0	3 7	2	1	0	0	3 3	1	2	0	0	3 7	2	1	0	0	3 7	2	1	0	0
Memorex 660	4	40	3 8	3	1	0	0	3 8	3	1	0	0	3 8	3	1	0	0	3 5	3	0	1	0	3.8	3	1	0	0
Mohawk 2700 2900	3	25	3 7	2	1	0	0	3 7	2	1	0	0	3 7	2	1	0	0	3 0	1	1	1	0	3 3	2	0	1	0
Subtotals	10	99	3 8	8	2	0	0	3 7	7	3	0	0	3 6	6	4	0	0	3 4	6	2	2	0	3 6	7	2	1	0
I8M 3330	3	64	4 0	3	0	0	0	3 7	2	1	0	0	4 0	3	0	0	0	4 0	3	0	0	0	3 7	2	1	0	0
IBM 3330 Replacements—																											
Calcomp (8raegen)																											
230	5	74	2 8	0	4	1	0	3 2	1	4	0	0	2 8	0	4	1	0	3 2	3	1	0	1	2.6	1	2	1	1
235(double density)	4	66	3 5	2	2	0	0	3 5	2	2	0	0	3 5	2	2	0	0	3 0	2	1	0	1	2 8	1	2	0	1
Control Data 33301 33302	6	45	3 3	2	4	0	0	3 3	2	4	0	0	3 5	3	3	0	0	3 0	0	6	0	0	2 3	0	2	4	0
Itel 7330 (NAS)	20	251	2 9	8	4	5	3	3 3	8	10	2	0	2 1	2	10	3	5	2 7	1	13	5	1	2 3	2	9	1	8
Memorex																											
3670	9	57	3 4	5	3	1	0	3 8	8	0	1	0	3 2	3	5	1	0	2 9	3	3	2	1	2 9	3	2	4	0
3675 (double density)	13	187	3 5	7	6	0	0	3 8	11	2	0	0	3 4	5	8	0	0	3 2	6	4	3	0	3 5	8	3	2	0
Telex 6316	5	77	3 4	2	3	0	0	3 8	4	1	0	0	3 4	2	3	0	0	3 2	1	4	0	0	3 0	1	3	1	0
Subtotals, independents	62	757	3 2	26	26	7	3	3 5	36	23	3	0	3 0	17	35	5	5	3 0	16	32	10	4	2 7	16	23	13	10
IBM 3340 Replacements—																											
Memorex 3640	8	45	3 8	6	2	0	0	3 8	6	2	0	0	3 6	5	3	0	0	3 5	4	4	0	0	3 5	4	4	0	0
IBM 3350	7	111	3 4	3	4	0	0	3 9	6	1	0	0	3 4	3	4	0	0	3 0	3	2	1	1	3 3	3	3	1	0
IBM 3350 Replacements—																											
Memorex 3650	13	119	3 4	6	6	1	0	3 6	8	5	0	0	3 2	6	5	1	1	3 2	6	5	1	1	3 0	5	5	1	2
STC 8350	6	173	3 0	0	6	0	0	3 3	2	4	0	0	2 8	0	5	1	0	3 3	2	4	0	0	3 5	3	3	0	0
Subtotals independents	19	292	3 3	6	12	1	0	3 5	10	9	0	0	3 1	6	10	2	1	3 3	8	9	1	1	3 2	8	8	1	2
Totals by Vendor— **																											
Calcomp (8raegen)	14	164	3 2	4	9	1	0	3 3	6	7	0	1	3 3	6	6	2	0	3 3	8	4	0	2	2 9	4	6	1	2
Control Data	13	407	3 5	7	5	1	0	3 4	6	6	1	0	3 4	6	6	1	0	3 0	4	7	0	2	2 7	4	3	4	2
Itel	20	251	2 9	8	4	5	3	3 3	8	10	2	0	2 1	2	10	3	5	2 7	1	13	5	1	2 3	2	9	1	8
Memorex	47	448	3 5	27	18	2	0	3 7	36	10	1	0	3 4	22	22	2	1	3 2	22	16	7	2	3 3	23	15	7	2
STC	9	245	3 2	2	7	0	0	3 4	4	5	0	0	3 1	2	6	1	0	3 4	4	5	0	0	3 6	5	4	0	0
Telex	8	94	3 6	5	3	0	0	3 9	7	1	0	0	3 6	5	3	0	0	3 1	1	6	0	0	3 0	2	3	2	0
Others	5	32	3 0	1	3	1	0	3 4	2	3	0	0	2 6	0	4	0	1	3 0	0	5	0	0	2 4	0	3	1	1
Subtotals. independents	119	1666	3 3	56	50	10	3	3 5	71	43	4	1	3.2	45	58	9	7	3 1	41	57	13	7	2 9	42	43	17	15
I8M Totals	10	175	3 6	6	4	0	0	3 8	8	2	0	0	3 6	6	4	0	0	3 3	6	2	1	1	3 4	5	4	1	0
Grand Totals	129	1841	3 4	62	54	10	3	3 6	79	45	4	1	3 7	51	62	9	7	3 1	47	59	14	8	3 0	47	47	18	15

Datapro Chart

*All Response Counts are expressed in terms of the number of user responses The legend is E for Excellent, G for Good, F for Fair, and P for Poor The weighted averages (WA) are derived by giving each response equal weight and assigning a numerical value of 4 (Excellent), 3 (Good), 2 (Fair), or 1 (Poor) to each rating Cross totals may not sum to the number of responses because not all responses included a rating in every category

**Totals for some vendors exceed the sum of individual quantities for specific models in the upper section of the chart because we included in the vendor totals any responses on unspecified models and on models that received fewer than three mentions

PCM Disk Drives: A Good Deal If . . .

By Tom Henkel
CW Staff

DELRAN, N.J. — You can get a good deal for a disk drive from a plug-compatible manufacturer (PCM) — if you know what your're looking for, a recent report from Datapro Research Corp. suggested.

PCM disk drives are cheaper than disk drives from a mainframer. That is why most users go to independent vendors for peripherals, according to Datapro.

But there is more to selecting an independent disk drive than just looking at price tags, Datapro noted. The actual dollars saved and the percentage of the total systems cost that savings represents is important.

However, the user must also consider installation costs and the staff time needed to install new peripherals, Datapro pointed out.

Although peripherals are billed as plug-compatible, installing them is more complicated than just plugging them in. And once installed, they have to be tested, which takes up CPU time and requires several staffers. That should be included in the total cost, according to Datapro.

It's also a good idea for a user to know exactly what it wants before actually getting into the market for disk drives. Many DPers neglect the task of evaluating hardware configurations in terms of the processing work load. If this evaluation is allowed to slide, a DPer may find himself looking for inadequate hardware or too few drives, the report said.

Finding the right disk drive is tougher than it was in the past few years: "Telefile [Computer Products, Inc.] has dropped its Honeywell- and Univac-compatible disk drives, and Potter [Instrument Co.] has dropped out of the end-user market. On the other hand, new plug-compatible disk drives have been introduced by Calcomp [California Computer Products, Inc.] (now marketed by Braegan [Corp.]) and Telex [Computer Products, Inc.], while Amperif [Corp.] and Interscience Systems Inc. have entered the market with Univac-compatible drives."

Software Alternatives

Datapro urged DPers to investigate alternatives before adding on more disk drives.

For example, some software products can prove more effective in decreasing costs and improving a DP shop. A report writer, for example, can cut costs by automatically preparing all those one-shot reports. If effective multiprogramming is a DP shop's goal, a second printer may help make that goal a reality.

There are other ways to cut costs, too. A user can accumulate purchase credits to buy rented peripherals. A purchase leaseback arrangement with a third-party vendor might also be a more efficient way of spending money.

To exercise those options, however, the user must be willing to stick with

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For 370 Add-On Units

National Semi, Memorex Top Memory Scores

By Jay Woodruff
CW Staff

DELRAN, N.J. — Users of IBM 370-compatible add-on memories gave highest performance ratings to products from National Semiconductor Corp. and Memorex Corp, followed closely by Intel Corp. and Electronic Memories & Magnetics Corp. (EMM), in a recent Datapro Research Corp. survey.

With 4 representing "excellent" in Datapro's weighted averaging system, both National Semi and Memorex users rated their equipment at 3.8 for overall performance. Intel and EMM memories garnered scores of 3.7 and 3.6, respectively.

The survey report, "How to Select and Use Add-on Memory," details the opinions of 124 IBM 360 and 370 users with add-on memories from 13 vendors. In addition to overall performance, the users were asked to rate the products' reliability, maintenance service and ease of installation on a four-point scale in which 1 represented "poor."

Memorex High

Only Memorex, which has since withdrawn from the large mainframe add-on memory market, received consistently high scores (3.6 or higher). However, every vendor with the exception of Cambridge Memories, Inc. (CMI) succeeded in scoring at least 3.0 in these categories.

Datapro warned that some of the survey results (see chart above) were based on too few responses to generalize safely on the performance of some vendors' add-ons. Ratings by only a few users may have been heavily influenced by the performance of local distributors, the report suggested.

Twelve users with 22.5M bytes of CMI memory rated their IBM 370-compatible memory as fair to good — 2.5 for overall performance, while 14 Control Data Corp. users with 23.9M bytes of installed add-on memory rated that vendor's equipment at 3.2.

Itel Corp. memories, now marketed by National Advanced Systems, averaged 3.1 for the overall performance of 14.6M bytes of memory by eight users. Storage Technology Corp. (STC), represented by 515M bytes of memory from three users, received a 3.3.

In the reliability category, EMM scored highest with a 3.7, followed by Intel with a 3.4. National Semi and Itel were rated 3.6 and 3.0, respectively, while CMI got a 2.9 from its users.

For maintenance service, STC Tech-

(Continued on Page 13)

USER RATINGS OF ADD-ON MAIN MEMORY

Computer System and Memory Supplier	No. of User Responses	Amount of Memory Represented, megabytes	User Ratings*																				Malfunction Diagnosis & Service		
			Overall Performance					Equipment Reliability					Maintenance Service					Ease of Installation							
			WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P	N	M	S
With IBM System/360																									
Ampex	7	14.0	2.7	2	2	2	1	2.7	2	2	2	1	2.4	1	2	0	2	3.4	5	1	0	1	2	3	2
EM&M	5	4.6	3.4	3	1	1	0	3.4	3	1	1	0	2.3	1	1	0	2	2.3	1	0	2	1	2	1	2
Fabritek	4	2.7	3.5	2	2	0	0	3.3	1	3	0	0	3.0	1	2	1	0	2.8	0	3	1	0	1	3	0
Standard Memories	3	0.3	4.0	3	0	0	0	4.0	3	0	0	0	3.3	2	0	1	0	4.0	3	0	0	0	2	1	0
Others	7	3.7	3.6	5	1	1	0	3.6	5	1	1	0	2.7	1	3	3	0	2.9	3	2	1	0	3	4	0
Subtotals	26	25.3	3.2	15	5	3	1	3.3	14	7	4	1	2.7	6	8	5	4	3.0	12	6	4	2	10	12	4
With IBM System/370																									
Cambridge Memories	12	22.4	2.5	3	4	2	0	2.9	2	7	1	1	2.3	0	5	4	2	2.6	2	6	1	3	1	7	3
Control Data	14	23.9	3.2	6	5	1	1	3.2	7	2	3	1	3.6	6	7	1	0	2.6	3	6	3	1	4	8	2
EM&M	9	15.1	3.6	5	4	0	0	3.7	6	3	0	0	3.3	3	4	1	0	3.0	3	3	3	0	6	3	0
Intel	26	30.3	3.7	17	8	0	0	3.4	15	9	0	2	3.0	8	12	5	1	2.8	4	14	4	3	7	15	3
Itel (now NAS)	8	14.6	3.1	4	2	1	1	3.0	4	2	0	2	3.1	4	2	1	1	3.0	3	2	1	1	4	4	0
Memorex	5	8.0	3.8	4	1	0	0	3.6	3	2	0	0	3.8	4	1	0	0	3.6	3	2	0	0	4	1	0
National Semiconductor	5	14.0	3.8	4	1	0	0	3.6	4	0	1	0	3.5	2	2	0	0	3.2	2	2	1	0	4	1	0
Storage Technology	3	5.5	3.3	2	0	1	0	3.3	2	0	1	0	4.0	3	0	0	0	3.7	2	1	0	0	3	0	0
Others	4	5.6	3.0	1	2	1	0	2.5	1	1	1	1	3.3	2	0	2	1	2.8	0	3	1	0	2	1	1
Subtotals	86	139.4	3.4	46	27	6	2	3.3	44	26	7	7	3.2	32	33	14	5	2.9	22	39	14	8	35	40	9
With Other Computers	12	3.6	3.0	4	6	0	2	2.9	4	5	1	2	2.6	2	2	1	2	3.0	4	5	2	1	5	3	4
GRAND TOTALS	124	168.3	3.3	65	38	9	5	3.2	62	38	12	10	3.0	40	43	20	11	2.9	38	50	20	11	50	55	17

Datapro Chart

*Ratings are expressed in terms of the number of user responses The legend is E for Excellent, G for Good, F for Fair, P for Poor; WA is Weighted Average, based on weights of 4 for Excellent, 3 for Good, 2 for Fair, and 1 for Poor. At the far right, N is for No Problems, M is for Minor Problems, and S is for Serious Problems in diagnosing malfunctions and obtaining service.

IBM Disk Drives Tough to Match

(Continued from Page 10)

tion ratings, 3.5 in hardware reliability and low maintenance scores — 3.0 in promptness and 2.3 in effectiveness.

Braegen's 230 disk drive scored lowest of 3330-compatible drives with an overall rating of 2.8. It was rated 3.2 in ease of operation, 2.8 in hardware reliability, 3.2 in maintenance promptness and 2.6 in maintenance effectiveness.

The 2314 Competition

In the now-defunct IBM 2314 market, Control Data Corp.'s 23121/23141 drive scored a top 4.0 in overall performance, but lower (3.3) in hardware reliability. It scored 3.7 in all other categories.

Memorex's 660 scored 3.8 in overall performance, ease of operation, hardware reliability and maintenance effectiveness, but 3.5 in maintenance promptness.

The Mohawk Data Sciences Corp. 2700/2900 scored lowest in the 2314-compatible class with a respectable 3.7 overall performance rating. The machine scored well in ease of operation and hardware reliability (3.7 in each), but poor in maintenance with a 3.0 in promptness and 3.3 in effectiveness.

A report on IBM's 2314 was not available, Datapro said.

The survey report, "All About Plug-Compatible Disk Drives," costs $15 from Datapro at 1805 Underwood Blvd., Delran, N.J. 08075.

SUBSYSTEM STRENGTHS AND WEAKNESSES AS REPORTED BY USERS

Disk Subsystem	Number of of User Responses	Number of Drives Represented	Subsystem Strengths*							Subsystem Weaknesses*						
			Controllers	Drive Units	Problem Diagnosis	Parts Availability	Loading Features	Noise	Heat	Controllers	Drive Units	Problem Diagnosis	Parts Availability	Loading Features	Noise	Heat
IBM 2314 Replacements—																
Control Data 23121/23141	3	34	3	3	3	3	3	2	1	0	0	0	0	0	0	1
Memorex 660	4	40	4	4	2	3	3	1	1	0	0	1	0	0	0	0
Mohawk 2700/2900	3	25	3	3	2	2	3	1	1	0	0	1	1	0	2	1
Subtotals	10	99	10	10	7	8	9	4	3	0	0	2	1	0	2	2
IBM 3330	3	64	3	3	3	3	2	2	1	0	0	0	0	1	0	1
IBM 3330 Replacements—																
Calcomp (Braegen):																
230	5	74	3	3	2	4	3	2	2	1	0	2	0	0	1	1
235 (double density)	4	66	2	2	2	1	1	1	1	0	0	1	0	0	0	0
Control Data 33301/33302	6	45	1	3	1	3	3	4	6	5	0	5	3	0	2	0
Itel 7330 (NAS)	20	251	7	8	6	10	11	4	4	10	8	12	6	2	8	10
Memorex																
3670	9	57	8	7	4	5	6	4	3	1	1	4	2	2	3	2
3675 (double density)	13	187	7	9	5	6	7	6	3	1	1	2	3	1	2	4
Telex 6316	5	77	4	4	3	3	3	1	2	0	0	2	1	0	2	0
Subtotals, independents	62	757	32	36	23	32	34	22	21	18	10	28	15	5	18	17
IBM 3340 Replacements—																
Memorex 3640	8	45	4	7	4	4	4	3	2	0	0	1	1	0	1	2
IBM 3350	7	111	4	6	3	4	NA	3	2	1	0	2	2	NA	0	0
IBM 3350 Replacements—																
Memorex 3650	13	119	10	12	3	5	NA	6	5	1	0	8	3	NA	5	4
STC 8350	6	173	3	3	3	3	NA	3	2	0	1	0	0	NA	0	1
Subtotals, independents	19	292	13	15	6	8	—	9	7	1	1	8	3	—	5	5
Totals by Vendor—**																
Calcomp (Braegen)	14	164	9	9	7	9	7	6	5	1	0	5	0	1	1	2
Control Data	13	407	6	8	6	8	10	10	10	7	2	7	5	0	2	2
Memorex	47	448	33	39	18	23	20	20	14	3	2	16	9	3	11	12
STC	9	245	5	5	5	5	3	5	4	0	1	1	0	0	0	2
Telex	8	94	6	7	5	5	6	2	3	0	0	2	1	0	2	0
Others	5	32	3	4	2	4	3	2	2	2	1	3	0	1	2	2
Subtotals, independents	119	1666	72	83	51	66	63	50	43	23	14	47	22	7	28	31
IBM Totals	10	175	7	9	6	7	2	5	3	1	0	2	2	0	0	1
Grand Totals	129	1841	79	92	57	73	65	55	46	24	14	49	24	7	28	32

Datapro Chart

*All results are expressed in terms of the number of responding users who checked each strength or weakness

**Totals for some vendors exceed the sum of individual quantities for specific models in the upper section of the chart because we included in the vendor totals any responses on unspecified models and on models that received fewer than three mentions

NA = Not Applicable

IBM Unit Comes in No. 8

Tape Users Rate STC's 3420-Type Drive Tops

By Tom Henkel
CW Staff

DELRAN, N.J. — The Model 3450 tape drive from Storage Technology Corp. (STC) was rated best in a recent survey of 92 users of IBM 3420-compatible tape drives. IBM's offering came in eighth in a field of 10 drives.

The users were asked by Datapro Research Corp. to rate the 3420 and compatible tape drives on overall performance, ease of operation, hardware reliability, maintenance promptness and maintenance effectiveness. The ratings were made on a scale of 1 to 4, with 1 representing poor and 4 representing excellent.

The STC 3450 came out on top in all five categories. It rated 4.0 in overall performance and ease of operation and received a 3.6 in the other categories.

Memorex Corp.'s 3220 tape drive came in second with an excellent ease of operation rating and a 3.8 in overall performance. The unit received 3.8 ratings in both maintenance promptness and effectiveness, but reaped a lower 3.6 rating in hardware reliability.

The STC 3670 came in a close third with a 3.7 overall performance rating. The unit scored lower in ease of operation (3.3) and hardware reliability (3.4), but rebounded for maintenance promptness and effectiveness with 3.7 and 3.6, respectively.

The STC 3430 came in fourth with a 3.8 in ease of operation and 3.6 in both overall performance and hardware reliability. The unit received mediocre maintenance reports of 3.5 for promptness and 3.4 for maintenance.

STC also took a three-way tie for fifth place with its 3470, 3630 and 3650 drives each scoring a 3.5 for overall performance.

The 3630 scored best in the other categories, with a 3.8 in ease of operation, a rather low 3.3 in hardware reliability and a 3.8 in maintenance promptness. Maintenance effectiveness came in lower at 3.5.

The STC 3650 received mediocre scores across the board — 3.4 in ease of operation, 3.3 in hardware reliability, 3.5 in maintenance promptness and 3.2 in maintenance effectiveness.

The 3470 was rated worst of the STC line with a 3.0 in ease of operation, 3.3 in hardware reliability, 3.3 in maintenance promptness and 3.0 in maintenance effectiveness.

Eighth Place

IBM's 3420 drive placed eighth in the Datapro survey. Users gave that unit an overall performance rating of 3.4, a hardware reliability rating of 3.3 and low maintenance ratings of 3.0 for promptness and 3.3 for effectiveness.

There was one bright light for IBM, however: The 3420 received a 3.8 rating for ease of operation.

Only two other tape drives ranked lower than IBM's. Those were the 345/347 from Braegen Corp. (which now markets California Computer Products, Inc.'s units) and Telex Computer Products, Inc.'s 6420.

The Telex 6420 got an overall performance rating of 3.2. Braegen's 345/347 scored lowest with a 3.0 overall performance rating.

The Datapro survey report, "All About Plug-Compatible Tape Drives," costs $15 from Datapro at 1805 Underwood Blvd., Delran, N.J. 08075.

USERS' RATINGS OF MAGNETIC TAPE DRIVES

Magnetic Tape Drive	Number of User Responses	Number of Drives Represented	Weighted Averages and Response Counts*																								
			Overall Performance					Ease of Operation					Hardware Reliability					Maintenance Service									
																		Promptness					Effectiveness				
			WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P
IBM 3420	9	87	3.4	4	5	0	0	3.8	7	2	0	0	3.3	4	4	1	0	3.0	3	4	1	1	3.3	3	6	0	0
IBM 3420 Replacements—																											
CalComp (now Braegen) 345/347	5	31	3.0	1	3	1	0	3.4	2	3	0	0	2.8	1	2	2	0	3.6	3	2	0	0	3.0	1	3	1	0
Memorex 3220	5	50	3.8	4	1	0	0	4.0	5	0	0	0	3.6	3	2	0	0	3.8	4	1	0	0	3.8	4	1	0	0
STC:																											
3430	8	41	3.6	5	3	0	0	3.8	6	2	0	0	3.6	5	3	0	0	3.5	4	4	0	0	3.4	3	5	0	0
3450	5	25	4.0	5	0	0	0	4.0	5	0	0	0	3.6	3	2	0	0	3.6	3	2	0	0	3.6	3	2	0	0
3470	4	43	3.5	2	2	0	0	3.0	1	2	1	0	3.3	1	3	0	0	3.3	1	3	0	0	3.0	1	2	1	0
3630	4	20	3.5	2	2	0	0	3.8	3	1	0	0	3.3	1	3	0	0	3.8	3	1	0	0	3.5	2	2	0	0
3650	18	561	3.5	9	9	0	0	3.4	8	9	1	0	3.3	6	12	0	0	3.5	9	9	0	0	3.2	6	10	2	0
3670	7	215	3.7	5	2	0	0	3.3	3	3	1	0	3.4	4	2	1	0	3.7	5	2	0	0	3.6	5	1	1	0
Telex 6420	6	46	3.2	2	3	1	0	3.7	5	0	1	0	3.0	2	2	0	1	3.0	2	2	2	0	2.7	1	2	3	0
Totals by Vendor—**																											
CalComp	7	45	2.6	1	3	2	1	3.0	2	4	0	1	2.3	1	2	2	2	3.3	4	2	0	1	2.6	1	3	2	1
Memorex	5	50	3.8	4	1	0	0	4.0	5	0	0	0	3.6	3	2	0	0	3.8	4	1	0	0	3.8	4	1	0	0
STC	52	990	3.6	30	21	1	0	3.4	27	21	4	0	3.3	21	28	3	0	3.5	28	24	0	0	3.3	22	25	5	0
Telex	10	66	2.8	2	5	2	1	3.1	5	1	4	0	2.6	2	3	2	2	2.9	3	4	2	1	2.4	1	3	5	1
Others	7	24	2.9	2	3	1	1	3.1	2	4	1	0	2.7	2	2	2	1	2.9	2	3	1	1	2.7	2	3	0	2
Subtotals, independents	81	1175	3.3	39	35	6	3	3.4	41	32	9	1	3.1	29	38	10	5	3.4	41	35	4	3	3.1	30	37	12	4
IBM Totals**	11	97	3.4	4	7	0	0	3.6	7	4	0	0	3.2	4	5	2	0	2.8	3	5	2	1	3.3	3	8	0	0
Grand Totals	92	1272	3.3	43	40	6	3	3.4	48	34	9	1	3.1	33	42	11	5	3.3	44	39	5	4	3.1	33	43	12	4

Datapro Chart

*All Response Counts are expressed in terms of the number of user responses. The legend is E for Excellent, G for Good, F for Fair, and P for Poor. The weighted averages (WA) are derived by giving each response equal weight and assigning a numerical value of 4 (Excellent), 3 (Good), 2 (Fair), or 1 (Poor) to each rating. Cross totals may not sum to the number of responses because not all responses included a rating in every category.

**Totals for some vendors exceed the sum of individual quantities for specific models in the upper section of the chart because we included in the vendor totals any responses on unspecified models and on models that received fewer than three mentions.

TAPE DRIVE STRENGTHS AND WEAKNESSES AS REPORTED BY USERS

Magnetic Tape Drive	Number of User Responses	Number of Drives Represented	Tape Drive Strengths*							Tape Drive Weaknesses*						
			Controllers	Drive Units	Problem Diagnosis	Parts Availability	Loading Features	Noise	Heat	Controllers	Drive Units	Problem Diagnosis	Parts Availability	Loading Features	Noise	Heat
IBM 3420	9	87	8	7	4	7	8	5	6	0	0	4	0	0	2	0
IBM 3420 Replacements—																
CalComp (now Braegen) 345/347	5	31	4	1	2	4	1	3	3	0	2	1	1	3	0	0
Memorex 3220	5	50	4	4	2	2	5	2	3	0	0	2	1	0	2	1
STC																
3430	8	41	5	6	6	6	3	4	3	0	0	1	0	1	0	2
3450	5	25	5	5	3	4	5	4	4	0	0	1	0	0	0	0
3470	4	43	3	3	2	1	1	0	0	0	0	1	1	2	2	1
3630	4	20	2	3	2	1	1	1	1	0	0	0	0	0	0	1
3650	18	561	12	14	12	11	8	7	8	0	1	2	1	4	4	0
3670	7	215	7	7	7	6	4	4	5	0	0	0	0	2	2	0
Telex 6420	6	46	4	4	3	3	5	2	2	1	1	2	2	0	2	1
Totals by Vendors—**																
CalComp	7	45	5	1	2	5	2	4	4	0	4	3	1	4	0	0
Memorex	5	50	4	4	2	2	5	2	3	0	0	2	1	0	2	1
STC	23	52	39	43	37	34	24	24	25	0	1	6	3	13	9	5
Telex	10	66	7	6	3	3	7	5	4	2	3	4	5	1	2	1
Others	7	24	4	3	3	6	5	6	6	1	2	4	0	1	0	0
Subtotals, independents	81	1175	61	58	47	52	44	43	42	3	10	21	10	20	14	8
IBM Totals**	11	97	10	9	4	9	9	6	7	0	0	6	0	1	3	1
Grand Totals	92	1272	69	65	51	59	52	48	48	3	10	25	10	20	16	8

Datapro Chart

*All results are expressed in terms of the number of responding users who checked each strength or weakness.

**Totals for some vendors exceed the sum of individual quantities for specific models in the upper section of the chart because we included in the vendor totals any responses on unspecified models and on models that received fewer than three mentions.

PCM Drives Can Be a Good Deal

(Continued from Page 10)

existing peripherals for some time, Datapro noted.

If a user decides to buy or rent additional peripherals, other factors should be considered.

Availability is one. A user should look not only at how long it will take to get a new machine, but also whether the machine is available in his geographic area. Few independent disk drive manufacturers have established nationwide service.

If a user buys or leases enough peripherals, some PCMs will provide an on-site customer engineer, but the user usually has to take at least 15 drives for that privilege, according to Datapro.

When it comes to cost, Datapro recommended looking at three areas: hardware costs, installation costs and maintenance costs.

The complete report, "All About Plug-Compatible Disk Drives," is available for $15 from Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

National Semi, Memorex Get Top Scores for Add-Ons

(Continued from Page 11)

nology dominated the field with a 4.0 rating from its users, although that rating was based on only three user responses. It was followed by Memorex (3.8) and CDC (3.6). CMI brought up the rear with a service rating of 2.3.

For ease of installation, a 2.6 rating was given to CMI and CDC, while EMM, Intel and Itel got ratings of 3.0, 2.8 and 3.0 respectively.

CDC and Intel users reported average installation times of 17.7 and 20.5 hours, respectively, to bring the add-on memories on-line, while Memorex (7.3 hours) and STC products (9.3 hours) were brought on-line twice as fast.

Purchases Decline

The amount of purchased add-on memory declined slightly from last year, possibly because many IBM users "hesitate to buy add-on memory for computers they might be replacing in the near future," Datapro said.

Any reservations IBM users might have about choosing non-IBM add-on memory "simply do not apply to main memory units" from add-on vendors, the report observed.

Why? Main memory has been refined to a high level of reliability; it is totally compatible with corresponding IBM memories; and it has similar, if not superior, performance when compared with IBM's own, according to the report.

Maintenance, "probably the area of greatest concern to most potential users of independent main memory units," is another area where users should expect little trouble, Datapro added.

Contents of Report

The report gives an overview of the market for add-on mainframe memory, the amount of memory that can be applied to any IBM system and what a user might expect to encounter when the memory is installed.

Further, the report defines the types of technology available in main memory, ranging from magnetic core — the old (15 years), reliable and highly refined technology — to semiconductor to the potentially competitive bubble memories.

The report provides a list of 89 add-on memories from the 13 vendors in a chart form, identifying the specific CPU model to which each memory model can be attached, the type of technology (core, MOS or bipolar semiconductor), cycle time and other specifications. Dimensions, prices and availability are also covered.

Copies of the 27-page report, which is reprinted from a recent supplement to *Datapro 70,* are available for $15 each from Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

CW, Chinese Government Plan Technical Magazine

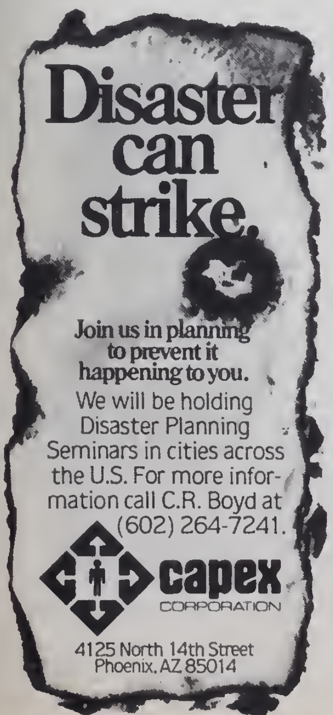
BEIJING, China — A technical magazine in the People's Republic of China is being inaugurated under the joint ownership of CW Communications, Inc., publisher of *Computerworld*, and the Chinese government.

Called *China Computerworld*, the publication will appear twice a month and will cover China's growing computer market. The first issue is scheduled for October.

The agreement is believed to be the first joint venture by the Chinese government and a foreign publishing firm involving the ownership and operation of a business publication. The Fourth Ministry of Machine Building, which deals with electronics and the computer and communications fields, and CW Communications will be the magazine's joint owners.

Under the tentative agreement, the U.S. firm will supply a capital contribution for start-up operations and will also provide international computer news, technical articles and management advice. Advertising space in the magazine will be sold to companies outside of China.

The Fourth Ministry will be responsible for translating international news, reporting on computer developments in China and printing and distribution.



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Afips Conference Board Includes NCC Board

ATLANTA - In a move it hopes will keep all its conferences on the same track as the National Computer Conference, the American Federation of Information Processing Societies (Afips) has established the Afips Conference Board.

The Afips Conference Board held its first meeting at the Afips-sponsored Office Automation Conference here March 4.

Afips wanted to establish a board that would do the same thing as the NCC Board — namely, decide the direction of conferences. However, the organization did not want to risk having two separate boards with potentially conflicting ideas on what makes up a good conference.

For that reason, Afips appointed the NCC Board to the Afips Conference Board, according to Afips' president, Dr. Albert S. Hoagland.

Both boards will perform basically the same function. The only difference is that when the group meets as the NCC Board, it will decide only NCC issues; when it meets as the Afips Conference Board, it will discuss more global Afips conference issues, Hoagland said.

Asked whether NCC or other Afips conferences could grow stale by having the same leadership, Hoagland replied that there are steering committees for each conference that actually decide the direction of a given conference. The conference board simply makes sure those ideas fit into Afips' long-range plans and remain consistent with NCC standards.

Voting Members

Voting members on the NCC Board and the Afips Conference Board are Chairman Robert Marrigan of Mail Communications, Inc: Carl Malstron, director of university systems at North Carolina State Univertiy; Dr. M. Stuart Lynn, University of California, Berkeley; and Dr. Dick B. Simmons, director of the data processing center at Texas A&M University.

Other voting members are Dr. Albert S. Hoagland, with IBM's San Diego office and president of Afips; Dr. Sylvia Charp, director of instructional systems for the School District of Philadelphia; Dr. Harold Borks, with the School of Library Science the University of California at Los Angeles; and Dr. Seymore Wollsson, with the computer science department at Detroit's Wayne State University.

As NCC Draws Nearer, Hotel Rooms Getting Scarcer

By Bruce Hoard
CW Staff

ANAHEIM, Calif. — As the National Computer Conference draws closer, hotel rooms here are becoming scarcer.

Of the approximately 14,000 rooms available on the nights of May 19, 20 and 21 in the Anaheim area, about half remain, acccording to Jerry Chiffriller, director of conferences for the American Federation of Information Processing Societies, Inc, (Afips), which sponsors NCC.

Chiffriller described the available lodging as "tight, very tight" and added that all the major hotels within Anaheim are booked up. However, he said that there are still rooms to be had in major hotels out of the city and motels within it.

Afips has reserved lodging as far away from the NCC Anaheim Convention Center site as Newport Beach, which is approximately 20 minutes south of Anaheim. Chiffriller stressed the fact that shuttlebus service would be provided there and at all hotels listed on the NCC housing form.

Housing forms are available through Afips at 1815 N. Lynn St., Arlington, Va. 22209.

Chiffriller also said that there would be "almost instantaneous" shuttlebus service between the Anaheim Convention Center at 800 W. Katella Ave. and the nearby Disneyland Convention Center, where there will be additional exhibitors and the Personal Computing Show.

There seems to be no shortage of airline reservations. "We weren't aware of any problems last time we checked," Chiffriller said. He added that past experience shows that attendees usually wait until the last minute to book flights.

Registration by Phone

This year, for the first time, people wishing to attend NCC may register by placing a toll-free telephone call to (800) 556-6882 and charging their admission to any major credit card. It is hoped that this procedure will shorten the waiting lines that have formed at previous conferences.

Full admission for four days is $60 in advance and $75 on-site. The daily charge for the same is $25 for all four.

There will also be 15 full-day professional development seminars costing $50. Another option is to attend a half-day seminar and related program sessions, also for $50.

Although up to 70,000 people are expected to attend the conference, Chiffriller said that only 1,471 have registered so far. He said that he was not alarmed at the low number because it is higher than a comparable number at the same time last year, and does not reflect the number of exhibitors' guests, which represents the largest single group of attendees.

One problem that plagued NCC in Anaheim two years ago was deficient air conditioning in the garage area that housed additional exhibitors next to the convention center.

"We are determined and confident that we will do a better job on the air conditioning this time," Chiffriller said. He added that more than $200,000 has been spent to alleviate the problem.

More than 400 vendors are expected to participate and will be spread from the main hall to the adjoining garage, and to another garage and other facilities at the Disneyland Hotel complex. Most estimated 1,400 exhibits will be in the main convention hall.

This years's total number of sessions will number around 100, or a drop of 50 from last year. Chiffriller explained that the decrease was initiated to stimulate attendance and increase the quality of individual sessions.

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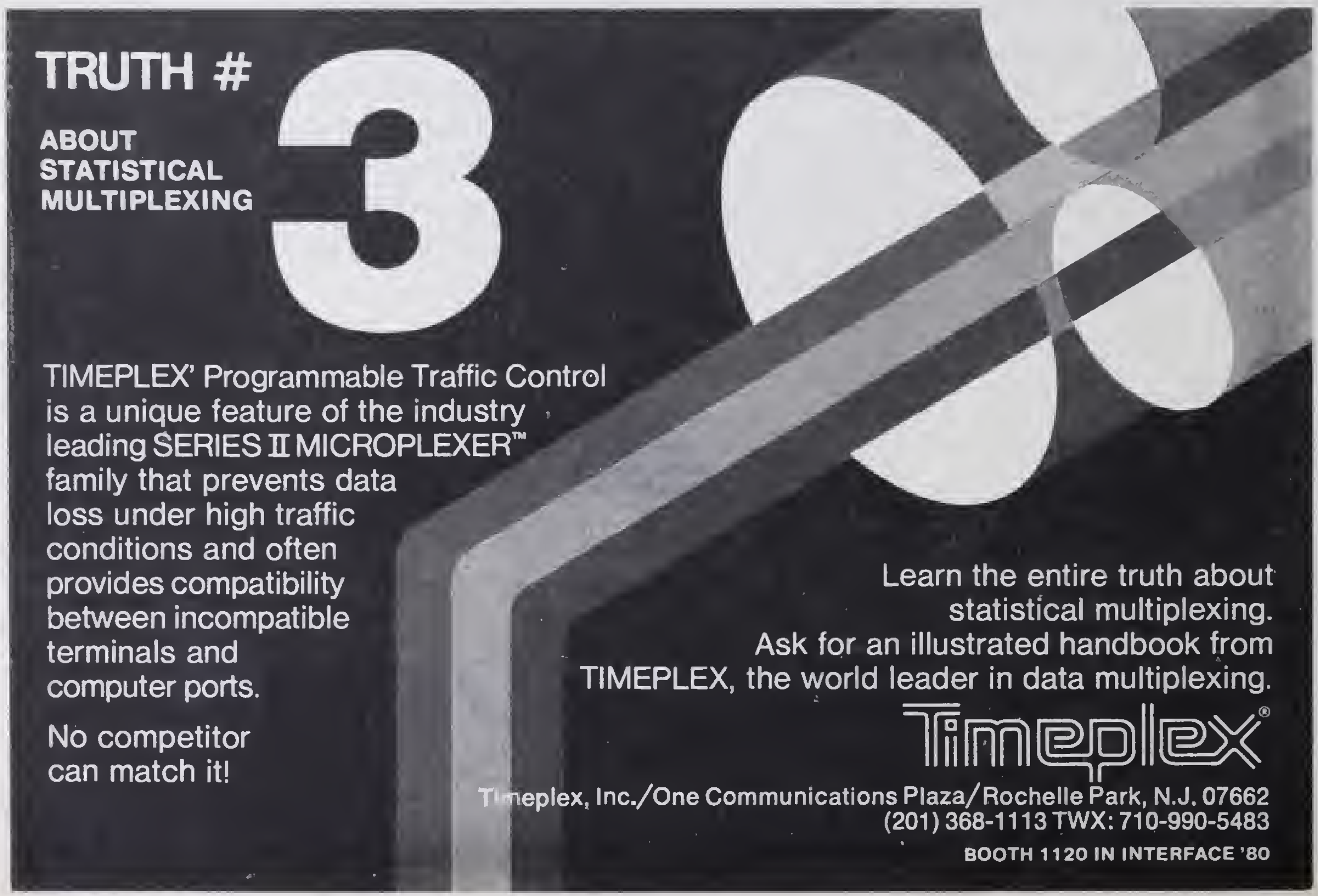

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Expo '80 Draws Crowd of 4,000 in Los Angeles

By Jeff Beeler

CW West Coast Bureau

LOS ANGELES — An estimated 4,000 computing professionals gathered here last week for the second of nine installments of the Expo '80 Conference and Exposition.

Visitors from throughout Greater Los Angeles and beyond converged at the central city's California Mart Convention Center to get a first-hand look at 43 vendors' products and services and to hear the words of 37 speakers at Expo '80's 19 conference sessions.

Exhibitors at the show included some of the industry's best-known suppliers — Univac, AT & T, Hewlett-Packard Co., Control Data Corp. and Microdata Corp., to name just a few — and their exhibits spanned a broad segment of the DP product spectrum. Wares on display ranged from small business systems to electronic mail equipment, from line printers to CRT graphics systems.

Like the show floor, Expo '80's conference program reflected a wide assortment of computing needs and interests. Although the program highlighted office-of-the-future systems, it also covered topics like distributed processing, data base management systems, computer output microfilm, integrated information systems and strategies for cutting communications costs.

Following its three-day layover in Southern California, Expo '80 headed for Dallas for another three-day stint beginning April 1.

Western Computer Systems rep (above right) "sells" attendee on company product while next door, vistor at Spectron Corp. booth challenges a point. Digital Equipment Corp. rep demonstrates WR 78 Word Terminal at lower left while (right) service rep changes board on Microdata Corp. line printer.

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4. How many levels of Data Flow Diagrams would be used to model a system of 1000 mini-specifications?
A. 1-2 levels B. 2-3 levels C. 3-5 levels D. 6-8 levels

5. The logical model of the existing system is typically smaller than the physical model of the existing system. How much smaller?
A. 10-20 percent smaller B. 20-40 percent smaller C. 50-70 percent smaller D. 100 percent smaller

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Teaching Structured Programming Reviewed

By Jeffry Beeler
CW West Coast Bureau

BERKELEY, Calif.—College-level teachers of structured programming techniques will have an opportunity to upgrade their professional skills and possibly expand their career horizons at a 10-day training session scheduled to take place July 7-18 at the University of California's main campus.

Entitled "Teaching Effective Design of Reliable Software Through Structured Techniques," the course will review the state of the art in structured programming, show how the subject should best be taught and look ahead to the methodology's expected trends.

The course's two cosponsors — the University of California's Extension Service and the Data Processing Management Association's Education Foundation — hope the session will attract 400 to 500 attendees from undergraduate business DP departments throughout the U.S.

Typical enrollees will include junior-college, four-year college and university instructors who teach or plan to teach structured design, programming and Cobol coding.

Opening Career Paths

The summer course was designed by consultant and author Gopal Kapur, president of Kapur & Associates Inc., a Danville, Calif.-based consulting firm. Kapur will head the session's four-member teaching staff.

In addition to being worth five units of academic credit, Kapur said, the course will provide attendees with the knowledge and skills they need to teach structured methodology courses to their students.

Kapur envisions the training program as a partial remedy to what he perceives an an acute shortage of career paths and professional-development opportunities for college-level business DP instructors.

Some of the lectures will cover topics like the theory of structured program design, structured design tools, structured coding, universal model programs and methods of teaching structured techniques.

Guest Speakers

In addition to the regular workshops and lectures, the training program will include a series of guest speakers representing private industry. The speakers will describe the professional skills they look for and demand when hiring entry-level programmer/analysts.

Course organizers advise prospective attendees to enroll by June 13, be proficient in Cobol and have some familiarity with structured programming concepts.

The training program's $375 admission fee covers tuition and classroom materials only. An additional $375 will be required for each enrollee desiring on-campus housing during the 10-day session. Checks should be made payable to the Regents of the University of California.

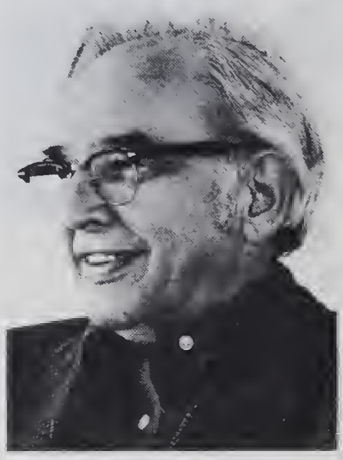
An application form or additional information about the training course is available from Department B, University Extension, University of California, 2223 Fulton St., Berkeley, Calif. 94720.

Atanasoff Honored as Inventor Of Electronic Digital Computer

By Brad Schultz
CW Staff

MIAMI BEACH, Fla. — Who invented the electronic digital computer?

Computing's chroniclers usually credit J. Presper Eckert and John W. Mauchly for that deed. A DP conference press luncheon here, however, recently honored a third man, 76-year old John Vincent Atanasoff, who conceived the first architecture for an electronic digital computer during the winter of 1937-38, according to the luncheon's sponsor, DPF, Inc.


John Vincent Atanasoff

A few years before Eckert and Mauchly built Eniac and Univac 1, the basic concept for such systems occured to Atanasoff after a long drive to a roadside inn near Moline., Ill., DPF, Inc. said. Eniac and Univac 1 — completed in 1946 and 1951, respectively — were, according to the computer lessor, the world's first large-scale computer systems.

The journey that ended in Moline, a hamlet on the Mississippi River, started in Ames, Iowa, where Atanasoff taught mathematics and physics.

For a number of months, the New York-born Iowa State College professor had sought a way to build a machine to assist his students in solving complicated mathematics problems, a DPF spokesman explained at the fete.

During the solitary car ride, Atanasoff was engrossed in thoughts that he was close to discovering a workable design.

Soon after reaching the inn, the scientist's mind "became unusually clear, and he rapidly sketched out the basics for a digital electronic log circuit and a regenerative binary memory," the spokesman said.

Digital Preference

Atanasoff wanted the education tool to be digital because he considered analog techniques too imprecise for his purposes.

Although power problems and environmental conditions can reduce the integrity of digital output as well, digital computers are generally more precise because, roughly put, their operation is more rigorously defined.

Not only precision, but also the issue of speed drew Atanasoff away from analog computers towards digital technology. That was centuries after Blaise Pascal and Charles Babbage drafted crude designs for a mechanical digital computer.

Very Good Year

With help from Clifford Berry, then an Iowa State graduate student, Atanasoff made a working prototype of an electronic digital computer in December 1939.

As completed in 1942, the Atanasoff Berry Computer (ABC) comprised two 1,500-bit drums for storing 50-bit words, 300 vacuum tubes, a spark printer and reader and an electronic adder circuit. The ABC was reportedly built for just $5,000.

The year 1942 also featured a proposal by Eckert and Mauchly to the U.S. Army for the Electronics Numerical Integrator and Computer (Eniac). As completed in 1946, Eniac had more than 17,000 vacuum tubes and weighed approximately 30 tons.

Despite Atanasoff's achievements, Eckert and Mauchly are generally credited for the first computer to be programmed by internally stored instructions, the 1949 Binary Automatic Computer (Binac), and the first general-purpose commercial system, the Universal Automatic Computer (Univac I) built in 1951.

Mauchly died in January [CW, Jan. 21].

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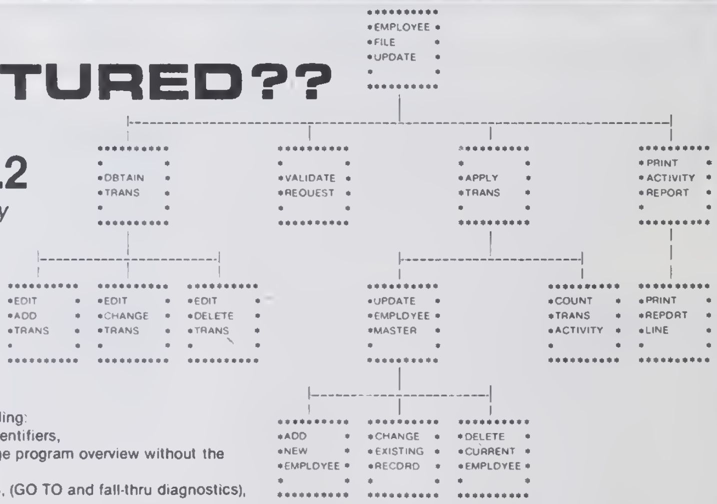

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Work Progressing on Model Of Business DP Curriculum

By Jeffry Beeler
CW West Coast Bureau

POMONA, Calif. — A nationwide effort to develop a model curriculum for undergraduate business information systems departments appears to be proceeding according to plan.

The project took a big step toward completion earlier this month when members of California State Polytechnic University's Information System Department finished analyzing and compiling the results of a Jan. 24-25 workshop aimed at laying the model curriculum's foundation.

To further refine their proposed curriculum, the workshop's organizers have already begun distributing the findings from their two-day conference to educators, textbook publishers and computing industry representatives throughout the U.S. Each of the recipients has been asked to critique the curriculum's proposed contents and provide the organizers with specific recommendations for improvements.

Regional Conferences

At a series of regional conferences slated late this year and early in 1981, organizers plan to fine-tune their preliminary model by integrating it with the best of the recipient feedback, according to Dr. Thomas Athey, chairman of Cal Poly's Information Systems Department and one of the main forces behind the January workshop. Current plans call for the model curriculum to be complete and ready for formal unveiling by June 1981.

Much of the groundwork for the proposed model was laid here at the Cal Poly campus, where the January curriculum development workshop took place. Although the conference's attendees came from all parts of the U.S. and represented diverse professional backgrounds — including industry, higher education and publishing — almost all the more than 100 participants agreed business computing differs substantially from computer science and therefore deserves to be taught as a discipline in its own right.

With that guiding philosophy in mind, the attendees opened their workshop with a pledge to develop a nationwide course of study that would prepare undergraduate information systems students to work during the 1980s as entry-level programmer/-analysts and later as project leaders. In the end, the workshop resulted in a tentative set of core courses that attendees hope will eventually become a recognized standard for business computing departments in universities and community colleges throughout the U.S.

Core Courses

In essence, the proposed standard consists of 10 core courses, including one introductory course and three each in the areas of programming, systems and advanced business computing. Within each course, the standard also specifies the topics to be covered and the DP skills to be stressed.

Specifically, the 10 core courses include "Introduction to Computer-Based Systems," "Applications Program Development I," "Structured Systems Analysis and Documentation," "Applications Program Development II," "Structured Systems Design and Evaluation," "Data Base Program Development," "Systems Planning and Project Management," "Applied Software Development Project," "Distributed Data Processing Systems" and "Future Information Systems Trends."

Athey and his workshop colleagues regard the 10 core courses not as a complete business DP curriculum in themselves, but rather as a foundation or starting point for building such a curriculum. Ideally, the core courses should account for no more than 70% of an undergraduate department's total information systems curriculum, with the balance of the program reserved for electives of the department's own choosing, Athey said.

Thus, the proposed core courses would serve a two-fold purpose. On one hand, they would introduce some much-needed uniformity to the U.S. business computing education by providing a set of basic guidelines to which all undergraduate information systems curricula would conform. But within those guidelines, each university or community college would still be free to tailor its course offerings to its individual academic requirements, Athey explained.

More details about the core courses' contents and objectives are available from Athey in the Information Systems Department, California State Polytechnic University, 3801 W. Temple Ave., Pomona, Calif. 91768.

MIC Lays Plans For Two Courses

CHERRY HILL, N.J. — Two seminars on "Data Entry Management and Supervision" and "Selecting and Using Business Minicomputers" will be presented in various cities by Management Information Corp. (MIC) this spring and summer.

The former, a three-day seminar, is designed to provide data entry managers and supervisors with techniques to manage and improve production in a centralized or decentralized data entry installation.

The latter is aimed at helping businesses select, evaluate and manage minicomputer systems for a small company or a department within a large company. This seminar lasts two days.

Guide Offered

MIC is also offering "Management's Guide to Computers and Office Systems," a catalog of 20 publications and seminars of interest to DP and office management personnel. It is available at no cost.

Included are descriptions of reports that evaluate business micro- and minicomputers, word processing systems, data entry systems, distributed processing systems and application programs.

The guide also includes specific procedures on how to evaluate and manage these systems.

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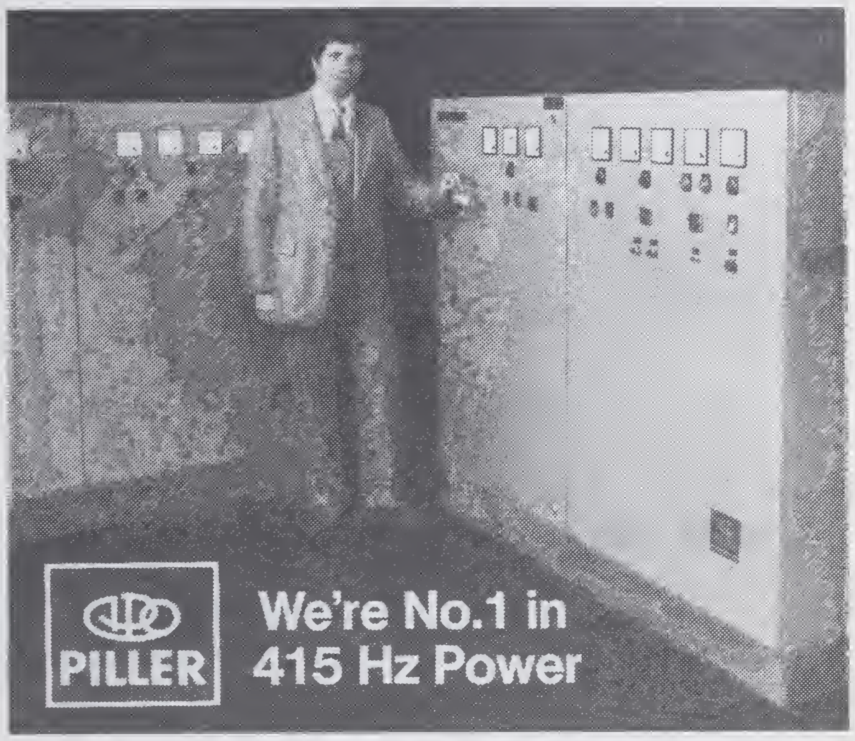

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Country Farmers Trying Viewdata-Type Service

By Ann Dooley
CW Staff

LEXINGTON, Ky.—Farmers in two Kentucky counties are using their "green thumbs" to harvest information about local crop conditions, weather and markets.

The farmers' green thumbs, in this case, happen to be specially designed terminals. With the terminals, a television set and a telephone, a farmer participating in the Green-Thumb Agricultural Weather/Marketing Project can access information on the local and national weather, crop commodities, crop and pest control and crop conditions.

While automated systems like this are available on national and state levels, this is the only one that provides information on a county level, according to Dr. John Ragland, project head and professor at the University of Kentucky here.

In operation since March 3, the system is similar to the UK's Viewdata service, with one exception. This version allows a user to store information in memory; Viewdata is not currently equipped to do so, Ragland noted.

Farmers seem "well pleased" with the system, so far, he added. The project is aimed to determining the feasibility of providing farmers and agriculture-related businesses with an automated, 24 hour, local information system.

Although initially intended to expand to 15 counties in 15 states, the project's long-term outlook is not as bright as when the system was inaugurated. Why? The overall economic picture has deteriorated, making federal funding more doubtful, according to Ragland.

Round-the-Clock System

The system revolves around the National Weather Service, Agricultural Marketing Service and Chicago Board of Trade teletypewriter lines that connect directly to the state's Hewlett Packard Co. 3000 Series III time sharing system, which provides weather and marketing information 24 hours a day. In addition to that information, state extension agents enter agricultural recommendations into the system.

The HP 3000 sorts the accumulated data by county to provide each with information appropriate to it, then transmits the data over leased lines to computers located in each county extension agent's office.

The local agent can add pertinent local information to the system. The county systems are specially developed Western Union, Inc. systems consisting of two Z80 microprocessors hooked together and providing up to eight phone lines for users calls. Software for the entire system was developed by Grumman Data Systems Corp.

Farmers can obtain any needed information on a 24-hour basis by using the "Green Thumb Box" attached to their home TV sets, and telephone lines. To use the system the farmer must turn on his TV set and dial the special extension agent's number on this telephone.

When the call is connected, a menu appears on the TV screen, and the farmer can make an information request through the 16-key key set on the Green Thumb Box. As many as eight items can be requested with each phone call.

Once the request are keyed in, the requested information is transmitted to the TV screen and the phone line is disconnected and ready for another caller. Data can be stored in the Box and called back on the screen whenever the farmer needs it or until it is erased from memory or the power is interrupted.

The Green Thumb Box was designed by Motorola, Inc. using its 3870 microprocessor chip with 8K bytes of memory and was built in cooperation with Radio Shack. Data is transmitted at 300 bit/sec — a relatively slow rate because of the less powerful communications network in rural areas.

More than 100 farmers are currently participating in the pilot project.

Resource-Tracking System Developed for VA Hosptials

COLUMBUS, Ohio — Several Veternas Administration (VA) hospitals in the U.S. are turning to an experimental resource-tracking system to better manage their resource allocations.

According to Mike Huffenburger, a research scientist at Battelle, Inc., which developed the system, Battelle placed three data collectors for three weeks each in the Martinsburg, W. Va., and Cincinnati VA hospitals. During that time, they recorded even the most minute actions of what Battelle refers to as professional care given during the daily course of patient care.

Everything from temperature-taking to bed changing was observed and noted. In addition, VA officials noted the amount of ancilliary services-lab tests such as x-rays and radiology, for example administered.

Each data collector ended up with between 5,000 and 7,000 pieces of information, which were keypunched onto disk, then edited and analyzed by both Cobol programs and the Standard Statistical Package for Social Sciences.

The idea is to measure the amount of resources being consumed by patients at different levels of care such as intensive and acute. With that information in hand, the VA hopes to be able to allocate health care services on the most efficent and economical basis possible.

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Federal Action 'Unwarranted'

Congress Told Insurance Privacy a State Matter

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Insurance record privacy legislation now before Congress would lead to unwarranted federal involvement in insurance industry regulation, presently the function of state governments, according to insurance company executives.

Representatives of the insurance industry, a major user of computer and communications technology, told Senate and House of Representatives committees this month that federal action should be delayed until states have a chance to adopt model privacy legislation recently developed by the National Association of Insurance Commissioners (NAIC).

Proponents of House and Senate bills, however, testified that the almost certain failure of state legislatures to uniformly adopt state-level privacy proposals will necessitate passage of federal measures to ensure fair information practices by the insurance industry.

The bills before Congress, developed as part of the Carter Administration's "privacy initiative" [CW, Oct. 15], have received the backing of members of the Privacy Protection Study Commission (PPSC) and are supported by some segments of the insurance industry.

The legislation seeks to provide consumers with an "expectation of confidentiality" in their dealings with the industry, provide a code for industry information gathering activities and increase consumer access to their records and their ability to correct inaccurate information maintained about them by insurance companies.

Uniform Law

Rep. Barry Goldwater Jr. (R-Calif.), a PPSC member, told House and Senate subcommittees that a uniform insurance privacy law is necessary and that uniformity can only come from federal action.

"With the exception of government, the insurance industry demands and disseminates more information about American citizens" than any other organization, Goldwater testified before a Senate banking subcommittee March 10. Consumers call for privacy safeguards, he said, "but what they really demand is fairness."

Goldwater noted that under the proposals, enforcement would be left to the states, relying on traditional regulatory mechanisms. No new bureaucracy would be created and federal intrusion into state affairs would be minimal, he said.

State or Federal Action?

"No one seems to argue with the need for some kind of legislation" in this area, Washington attorney Ronald Plesser told the Senate subcommittee. Plesser, who was PPSC general counsel, said "the real split is on who is going to do it and [whether] implementation is from the state level or the federal level."

Addressing that question, representatives of several insurance companies and industry groups told the Senate panel and the House Government Information and Individual Rights Subcommittee that federal action is inappropriate and unwarranted.

At the very least, the subcommittees were told, Congress should wait and see what action states take on the NAIC model privacy bill.

"The NAIC perceives privacy legislation as an integral part of insurance regulation and . . . we think this is rightfully the purview of the state insurance departments," NAIC representative James W. Newman, Virginia insurance commissioner, said.

Federal Guarantee

Other testimony, however, showed that view is not uniform throughout the industry.

"It is clear that privacy legislation will be enacted on the state level," the subcommittee was told by Thomas F. McDermott, vice-president, Metropolitan Life Insurance Co. "It is also clear that state privacy laws and regulations will vary substantially," he added in supporting federal action.

Even if the NAIC bill is adopted by most states, privacy protection will still need federal guarantee, according to Robert Ellis Smith, publisher of the *Privacy Journal,* who said the NAIC bill was drafted only because the insurance industry fears Federal Trade Commission regulation.

"You have to have the Damocles sword [of government] dangling over the industry in order to get movement," he said, terming the NAIC bill "deceptive because it goes under the guise of consumer protection and it really isn't."

The bill was drafted for the benefit of the industry and not its customers, according to Smith, who said the legislation "giveth in large type and taketh away in small print."

Smith was backed by Dr. Harold Skipper Jr., of Georgia State University and a contributor to the PPSC and privacy initiative efforts, who told the House subcommittee March 3 that NAIC support for state-level action "should be viewed by members of this committee as further proof as to the need of this [federal] legislation."

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Trade, Not Privacy Held Key to Data Flow Issue

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — U.S. negotiators should approach disputes over international movement of data as a trade and economic issue rather than a matter of privacy or technology, a congressional committee was told recently.

Existing U.S. trade officials, such as the U.S. Trade Representative, should be charged with developing and implementing U.S. policy on transborder data flow. And the State and Commerce Departments should be relieved of much of their responsibility in this area, according to recent testimony before the House of Representatives Subcommittee on Government Information and Individual Rights.

"When presented as a trade issue, a data flow dispute [could] then be handled by officials well-versed in trade disputes," Harry L. Freeman, senior vice-president of American Express Co., told the subcommittee.

U.S. industry is concerned that foreign data protection laws, ostensibly drafted to guarantee personal privacy, might in an era of economic decline be applied "arbitrarily and discriminatorily" to erect protectionist trade barriers, Freeman said.

Freeman's testimony came during the second day of subcommittee hearings called to gather information on how the U.S. government can best be organized to develop a comprehensive policy on transborder data flow issues [CW, March 17].

U.S. DP Threatened

In an opening statement, Subcommittee Chairman Rep. Richardson Preyer (D.- N.C.) said the hearings had "confirmed the initial perception of the subcommittee that confusion and lack of coordination — rather than the effective protection of American interests and the development of national policy — plague the executive agencies whose expertise and experience is crucial to resolving problems in this area."

Preyer said the subcommittee has become "dramatically aware of threats to the vitality — indeed, the very existence — of the American DP and communications industries in international markets."

American Express' Freeman told the panel that transborder data flow restrictions will increase as a problem for American firms because the U.S. economy is evolving into a service economy and "a service-based economy is an information based economy.

"Today we are moving into an era in which trade will consist increasingly of information exchanges. Even where international trade involves manufactured goods, that trade will be dependent on information exchanges," he said.

Nontariff barriers to the export of services are a relatively new problem, Freeman noted. "Neither we nor our major trading partners have been organized to handle complaints concerning, or to negotiate, service sector trade problems."

He added that the government should not be blamed for the lack of comprehensive policies on barriers to information flows. Only recently, he explained, has the private sector brought its concerns to the government's attention.

Ineffective Handling

However, State Department handling of the issue to date has been "very ineffective," Freeman said. State's Bureau of Oceans and International Environmental and Scientific Affairs-which together with the Commerce Department's National Telecommunications and Information Administration has primary authority for making policy in this area-tends to treat transborder data flow "as a scientific issue," according to the American Express executive.

He strongly urged that the U.S. Trade Representative's office be given that responsibility. That office, Freeman said, is where "the power and the people reside to handle it as a trade issue. For in the final analysis it is a question of exports and our balance of payments."

The trade Representative could easily acquire whatever additional staff would be necessary for more expertise in information and electronics, he added.

Request for Muscle

The government should stop concentrating on the technological issues involved. The U.S. should instead use its influence as a major trading partner of those nations, primarily European countries and Japan that would restrict international data communications networks such as that of American Express, Freeman said.

His testimony was supported by other industry representatives at the hearing and by a panel of private citizens — including former Central Intelligence Agency Director William Colby — that also appeared before the subcommittee March 13.

John Eger, Washington attorney and former Presidential science adviser, said the U.S. is highly vulnerable to the barriers to international data flows because its economy is becoming so dependent on information and because it is "ill-prepared" for "this new trade war."

"The government has yet to ascertain the nature of the change in trade, let alone begin negotiating solutions," Eger told the Preyer subcommittee.

"Time is of the essence," according to Eger. "The U.S. must bargain for the free flow of information and information products through multilateral trade negotiations and bilateral agreements with Europe, Canada, Japan and other developed nations."

D.C. Chapter of SMIS Sets April 8 Workshop

WASHINGTON, D.C. — The Capital Area chapter of the Society for Management Information Systems (SMIS) will sponsor an April 8 luncheon and workshop on business system planning.

The speakers will be Michael J. Pendino and Barbara Kuebler. The luncheon and workshop will be held at the Holiday Inn in Rosslyn, Va., from 11:30 a.m. to 4 p.m.

Further information can be obtained by calling the chapter answering service at (703) 734-0816.

Goldwater Proposes World Data Flow Congress

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Rep. Barry Goldwater Jr. (D-Calif.) has called for an international conference on communications and data flows because free international movement of information is "essential to the enhancement and preservation of liberty and freedom throughout the world."

In a congressional resolution early this month, Goldwater asked Congress to appropriate $3 million for the conference, to be held by Jan. 1, 1982. "Governments of the principal industrial nations will be invited to designate official delegations to attend," according to the Goldwater plan.

The conference would be held in recognition of the importance to industrialized societies of "communications and information transactions and associated activities." To that end, it would address "the growing divergence in national laws, regulations and practices which impose special conditions; preferential rates; tariffs and technical standards; taxation policies; and licensing, reporting and disclosure practices" on data movement.

This trend "may threaten fair commercial competition and may jeopardize the widest sharing and utilization of information and knowledge made possible by modern electronic technologies," according to the Goldwater resolution. A similar resolution was introduced by Goldwater during the last Congress [CW, Oct. 16, 1978].

In a statement that accompanied the resolution, the California congressman told his colleagues that so-called "privacy" laws being enacted by other countries "unfairly restrict markets for the world information and telecommunications industry, which is predominantly U.S.-owned."

Goldwater, who was a member of the U.S. Privacy Protection Study Commission, said modern information systems definitely are subject to abuses but that privacy laws of various countries 'must be harmonized in order to strike the proper balance between privacy protections and the free interchange of information."

Information stored and manipulated in "advanced communications and computer technology" is unquestionably "the lifeblood of governments and industry," he said. "As with any resource of such importance, the potential for abuse is great.

"The passage of privacy and data protection legislation by many industrial nations, including the U.S., during the past several years has been to some extent a reaction to this potential for abuse," Goldwater continued.

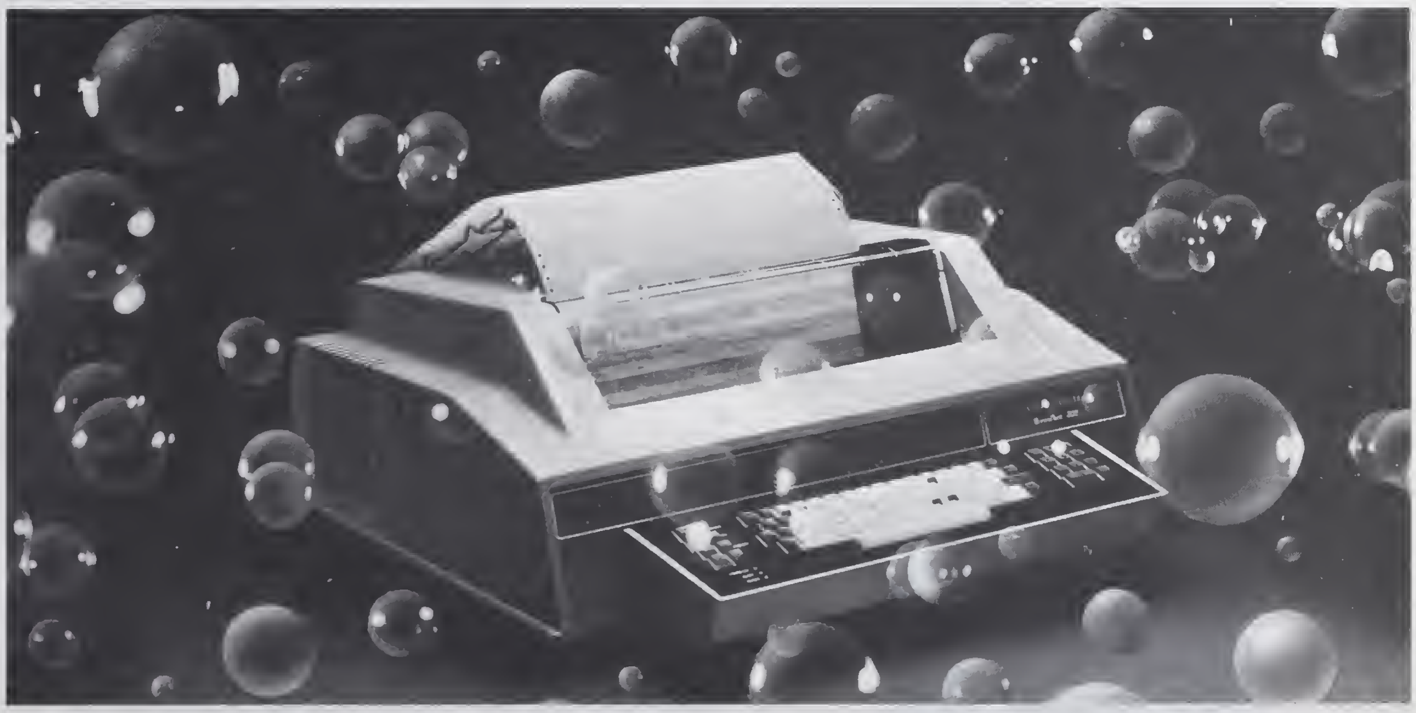
New Trade Barriers?

Although many of these laws were designed to protect individual privacy, "we now are seeing the emergence of national privacy legislation which is actually aimed at erecting new trade barriers," Goldwater said.

He singled out Sweden, France and West Germany as nations that "in particular have all enacted laws establishing some form of national 'data board' to monitor the use and storage of information." The countries "have discovered the simple fact that to block data flow in the 1980s is to block trade," Goldwater charged.

"As a result, multinational corporations face vast difficulties in transferring necessary data between countries in which they conduct business." This could adversely affect their operations and unfairly restrict world information markets, he said.

"Perhaps worst of all, the building of information walls around a nation in the name of 'privacy' has led to a hodgepodge of differing requirements which are incompatible," Goldwater added.



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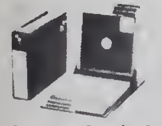

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Artificial Intelligence Meet Slated for August

By Jeffry Beeler
CW West Coast Bureau

PALO ALTO, Calif — A newly formed professional society serving the artificial intelligence community is requesting papers for its first annual conference and trade show, slated to take place Aug. 18-21 at Stanford University.

Artificial intelligence researchers interested in speaking at the conference should send the American Association for Artificial Intelligence (AAAI) four copies of their papers no later than May 1.

Submissions should be brief, preferably no longer than 1,000 to 2,000 words, according to the AAAI's conference coordinator Louis Robinson.

A one-day tutorial program slated to take place Aug. 18 will precede the AAAI's main conference, which starts on Aug. 19.

Topics to be discussed at the main conference will include robotics, cognitive modeling, vision, problem solving and search, artificial intelligence languages and software, theorem proving, theoretical foundations, mathematical foundations, knowledge representation, knowledge acquisition, specialized systems, program synthesis and understanding and natural languages.

Tutorial Program

At the preconference tutorial program, by contrast, participants will address just three main topics in an effort to examine the state of the art of the U.S. artificial intelligence research, Robinson said.

The three tutorial-program topics will include tools and techniques for knowledge-based systems, natural language-understanding systems and a technology overview for research-and development managers and others not directly associated with the artificial intelligence field.

The overview portion of the tutorial program will explore the current status of artificial intelligence research and examine market opportunities for artificial intelligence systems, while the portion dealing with natural language-understanding systems will cover the subject's basic issues as well as its latest theories, Robinson said.

Trade Show

Among its other activities, the AAAI's national meeting will offer a three-day trade show featuring hardware and software exhibits from artificial intelligence manufacturers and reasearch groups throughout the U.S. A preliminary list of these exhibitors is expected to be prepared by mid-May, Robinson said.

Scheduled to take place Aug. 19-21, the trade show will coincide with the AAAI's main conference and will be held in Stanford's Tressider Union.

An estimated 750 artificial intelligence researchers from universities and businesses throughout the U.S. are expected to attend the four-day event, Robinson predicted.

Would-be speakers at the conference should send their manuscripts to Robert Balzer, AAAI Conference Program Chairman, USC/Information Science Institute, 4676 Admirality Way, Marina Del Rey, Calif. 90291. Authors will be notified of their papers' acceptance or rejection by June 1.

Exhibit Analyzes Home Energy

BOSTON — The idea of a fully computerized house may be a few years off, but Boston's Museum of Science has cooked up a "House for All Seasons" that uses a Wang Laboratories, Inc. CPU to analyze users' energy needs.

The exhibit consists of a full-scale house cross-sectioned to expose the roof, walls and floors. Additional displays include explanations of energy-saving devices like caulking and weather stripping.

Beside the house is a Wang 2200MVP CPU and three CRT terminals. Visitors to the exhibit use the terminals to answer 21 energy-related questions about their own homes. After answering the questions, the CPU responds with an analysis of the users' homes.

The analysis evaluates the total floor space and flags likely areas where energy is being lost. It also makes suggestions about where to add insulation, what doors to weather-strip and what type of water heater to use, exhibit director Larry Bell said.

About 50,000 people a year visit the exhibit, which Bell said is one of the museum's most popular.

The idea for the house came somewhat by accident. The museum originally wanted to build an exhibit that would trace the effects of fossil fuels on the environment. That application turned out to be too complicated for the average patron, so Wang and the museum came up with the idea of the house, Bell said.

American Energy Systems designed and wrote the program, and Wang provided the hardware — three terminals with 64M bytes of memory. A matrix printer sits inside the house for special printouts and applications, Wang said.

Comments on the computer questionnaire ranged from "We could relate to it because we're planning to insulate our house" to "I was amazed at the money we could save after the initial period," Bell said.

"We tried in this exhibit to give a balanced presentation," Bell added. "We have purposely not produced this exhibit with funding from an energy-related industry. We felt that we could better avoid a biased presentation in this way."

Bell hopes to upgrade some of the Wang equipment for future use on other exhibits. Those displays, he said, should be as popular as the "House for All Seasons."

As for now, the museum plans to update some of the information on the computer. The most important update concerns the current price of heating oil. "That's something that can change from day to day," Bell noted.

Call for Papers

PACIFIC TELECOMMUNICATIONS CONFERENCE 81, Hawaii, Jan. 12-14.

The conference objective is to provide a forum on the technical, economic, regulatory and social aspects of communications throughout the Pacific. Papers are requested in such areas as telecommunications technology, its applications and appropriate services for developing societies; user experiences and perspectives related to services regulation and policy issues.

Papers wil be accepted for presentation and publication and also for publication only. Send three copies of the final version (not more than 20 pages) with a short abstract by July 18 to Richard J. Barber, PTC 81 director, Room 704, 2424 Maile Way, Honolulu, Hawaii 96822.

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Exclusively American Perspective

U.S. Artificial Intelligence Society Established

By Jeffry Beeler
CW West Coast Bureau

PALO ALTO, Calif. – U.S. researchers in artificial intelligence now have a professional society they can call their own. The newly formed group calls itself the American Association for Artificial Intelligence (AAAI), and its members seek to advance their chosen field by promoting information exchanges among their far-flung U.S. colleagues.

The AAAI is hardly the first scientific society to try to foster technology transfer within the artificial intelligence community. But the group is probably the only organization of its type to attack the artificial intelligence field from an exclusively American perspective, according to the AAAI's conference coordinator Louis Robinson.

In the past, Robinson explained, U.S. artificial intelligence researchers have kept abreast of developments in their field primarily through vehicles like the International Joint Conference on Artificial Intelligence (Ijcai), which periodically travels to some of the world's major cities.

As a forum for exchanging information about the latest artificial intelligence advances, Ijcai was intended by its founders to be primarily international in scope. As a result, the conference has always been limited in its ability to promote technology transfer within individual countries.

U.S. Forum

Today, however, U.S. artificial intelligence researchers need to know as much about the activities of their own American colleagues as they do about advances taking place halfway around the world, Robinson said.

But until recently, the only systematic way American researchers could keep tabs on developments in their own backyard was through worldwide organizations like Ijcai, which provided a poor substitute for the strictly national forum they needed.

So late last year, some of the biggest names in U.S. computing science banded together to form a professional society that they hoped would cater exclusively to the needs of the American artificial intelligence movement.

Their work, except for a few legal technicalities, is nearly complete and has resulted in a society that today boasts about 300 members including luminaries like Stanford University's Edward Feigenbaum and Carnegie-Mellon University's Allen Newell.

Members hope their society will eventually become the recognized "focal point" where the many diffused elements of the U.S.'s artificial intelligence effort will converge to form a coherent picture of the fast-moving discipline's state of the art, Robinson said.

The need for an AAAI-like organization in the U.S. has recently become acute, Robinson continued, partly because the country's growing volume of artificial intelligence work has made new developments increasingly difficult to monitor and partly because American researchers realize they must pool their expertise if they hope to keep pace with technical innovations abroad.

The AAAI plans to fulfill its role as the U.S. artificial intelligence focal point mainly through the publication of a quarterly newsletter, as yet unnamed, and through sponsorship of an annual trade show and conference.

Slated to make its debut sometime this summer, the newsletter will be edited by Allen Thompson of the University of Southern California's Information Science Institute and will contain technical articles written by leading artificial intelligence researchers both inside and outside the AAAI.

The first of the society's annual trade shows and conferences, meanwhile, will take place Aug. 19-21 at Stanford University here and will offer seminars covering topics like robotics, cognitive modeling, artifical intelligence languages, knowledge representation and program synthesis.

Supervised by conference chairman Jay Tenenbaum of SRI International, Inc., the event will be preceded on Aug. 18 by a one-day tutorial program examining subjects like knowledge-based systems and systems that understand natural languages.

More information about how to join the society can be obtained from Bruce Buchanan, AAAI Membership, Computer Science Department, Stanford University, Palo Alto, Calif. 94305.

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Simulations Show Oil Spill No Longer a Threat

By Jay Woodruff
CW Staff

CORPUS CHRISTI, Texas — Nine months after the biggest offshore oil well blowout in history, computer simulations show that the oil no longer threatens the U.S. coastline. The oil well was capped last week.

When the Ixtoc 1 well ruptured its casings on June 3, an estimated 30,000 barrels of oil a day began flowing into Campeche Bay in the Gulf of Mexico. It caught prevailing currents and headed north toward the town of Brownsville, Texas, just north of the mouth of the Rio Grande river.

By drilling two relief wells to reduce the pressure on the main well, unwanted output was reduced to about 2,000 barrels a day. Seasonal currents reversed the flow of the oil in September, carrying it out to sea.

The flow south from the well site will probably continue until April, when springtime currents carry it north again, but little of that oil trickle is likely to reach the Texas coast, according to Capt. Gerald Hinson, Coast Guard commander of the Marine Safety Office in Corpus Christi.

Simulation Model

Hinson, who is also designated Federal On-Scene Coordinator for the oil spill, said the Coast Guard continues to order periodic flights south from Corpus Christi to check the path of the oil.

Data gathered from the flights, along with historical data on ocean currents and winds, is fed into a simulation model developed shortly after the spill by the Hazardous Materials Support Team of Seattle, part of the National Oceanic and Atmospheric Administration's (Noaa) Pacific Marine Environmental Laboratory in Boulder, Colo. [CW, Aug. 13].

Data is processed on a Control Data Corp. CDC 6600 mainframe in Boulder, and the results are accessed here on a Texas Instruments, Inc. Silent 700 terminal.

Map Areas

Dr. Jerry Galt, oceanographer and staff researcher for Noaa, periodically calls on the system to indicate the position of the spill. He can order the oil's progress displayed in views as large as the entire Gulf of Mexico or as small as the area between Brownsville and Corpus Christi.

The TI terminal prints an outline of the shore in a field of 40 char. by 40 char. plus a number of points that are connected — using a template — to show an outline of the oil contained within the map area, according to Bob Pavia, another Noaa oceanographer.

The maps can show the concentration of light, medium and heavy oil at a specified number of locations as well as the total percentage of the amount of oil in the Gulf as it appears in the particular map section under study.

Using periodically updated data on the weather, currents, the location of the oil slick, the CDC processor can project — "just like a weather forecast" — where the oil will go in the next 12, 24, 36 or 48 hours. The degree of accuracy of the projection is directly related to the stability and predictability of the weather itself, Pavia explained.

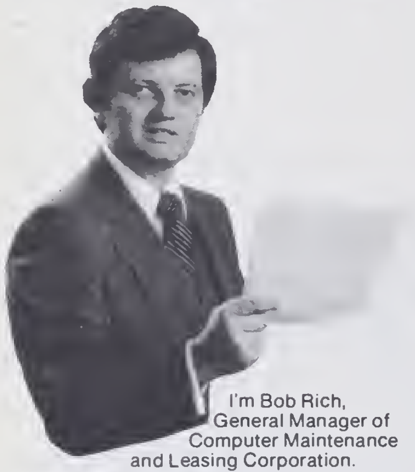
This type of forecasting is called tactical real-term forecasting, but Noaa also does long-term forecasts, where historical wind, current and weather data are combined to predict the likely movement of oil over an extended period of time, he noted.

Trajectory Model

The Coast Guard Oceanographic Unit, located in Washington, D.C., has also developed a simplified "oil trajectory" model of its own, which can be figured on a hand calculator. And Noaa has used, on an experimental basis, the Landsat satellite to follow the progress of the oil.

At press time, winds from the southeast and east have propelled a small patch of oil to an area off Brownsville, with larger patches appearing 250 miles further south.

However, unless ocean currents reverse themselves and flow north now instead of at their predicted time in April, the likelihood of oil reaching the shore here and doing a great deal of damage is remote, Pavia observed.



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FPS Users' Meet Set for April 28

BEAVERTON, Ore. — Fifteen technical papers and several guest speakers will highlight the meeting of users of Floating Point Systems, Inc. (FPS) array processors April 28-30 in San Francisco.

The papers will address various topics including "The Use of the Array Processors for Interactive Analysis and Classification on Landsat Multispectral Scanner Data" and "Automated Screening for Cervical Cancer Using Image Processing Techniques."

Dr. Lester Gerhardt of Rensselaer Polytechnic Institute in Troy, N.Y., will speak on "The Impact of the Microcomputer," and Gene M. Handel, senior engineering associate and supervisor of the Alternate Energy Group of Chevron Research Corp., will discuss alternative energy sources.

More information is available from Ralph K. Cook, Manager of Marketing Communications, Floating Point Systems, Inc., P.O. Box 23489, Portland, Ore. 97223.

MIT to Offer Summer Course

CAMBRIDGE, Mass. — MIT will offer a course entitled "Key Aspects of Information Systems Technologies: Data Base Systems, Telecommunications and Performance" Aug. 18-22.

The course was designed to address the combined needs of computer managers, users and systems designers who need to understand current and future aspects of computer-based information systems.

Topics to be covered include design, analysis, implementation and evaluation, with particular concentration on data management software techniques, and performance evaluation.

More information is available from the Director of Summer Session, Room E19-356, MIT, Cambridge, Mass. 02139.

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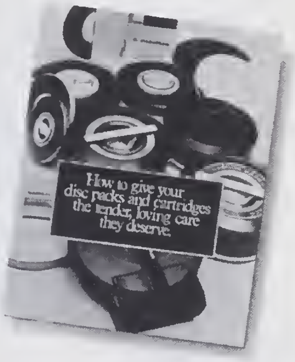
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Basic Skills Curriculum

Learning System Aids Developmentally Disabled

SUPERIOR, Wis.—The Achievement Center of Douglas County (ACDC) is using a computer system to store large quantities of curriculum data in a program designed to improve the lives of developmentally disabled people.

ACDC is itemizing life functions for its 62 clients into a curriculum of thousands of basic skills. Its hope is to develop a standardized system of learning that can measure not only the rate of student advancement, but the competency level of teachers and the success of the entire program. The Superior center is using a Hazeltine Corp. 1420 CRT terminal and a Digital Equipment Corp. Decwriter IV linked to a control Data Corp. Cyber-171 at the University of Minnesota in Duluth. At present, the curriculum consists of 2.5 million pieces of information, most of which are stored on disk.

Glen Dorfman, administrator of Douglas County Programs for the Catholic Charities Bureau of the Superior Diocese, which sponsors ACDC, is disenchanted with the performance of many special education teachers.

"We have some pretty strange people," he said, who are "good critical thinkers." However, many have an "art background" instead of any training in teaching developmentally disabled individuals.

The extensive curriculum is one way to attack the problem, Dorfman added.

Once complete, the curriculum could evaluate teachers by measuring the amount of time taken by individuals to teach the same skills to comparable clients. In turn, the rate at which clients learn will reflect the credibility of the program as a whole.

ACDC is utilizing a generalized file management system known as System Information Retrieval (SIR), and plans to obtain Statistical Package for the Social Sciences (SPSS), a major software package developed by Carleton College, in the near future.

Richard Reinoelh, an independent consultant working with ACDC on its curriculum system, called the system "probably the most sophisticated one out in the country." The programs for it are being written by Reinoelh, ACDC program director Sid Hartman and Diane Erb, who works for Reinoelh.

Initial Test

According to Dorfman, ACDC clients undergo six months of testing, during which their skills in many areas are measured. All that information is stored in Duluth. After the initial assessment, teachers use the curriculum to develop individualized educational plans.

The curriculum is developmental and automatically sets the next goal for the student once the preceding goal is accomplished.

Reinoelh described the system from the top down. There are 10 classes which are broken down to several levels or grades — first, second, and so forth. The grades are broken into approximately 200 areas such as house skills and personal growth.

Each area breaks down to 10 objectives. "Can prepare breakfast" is one objective. Objectives are then broken down to 20,000 subobjectives. "Can turn eggs; is a subobjective of "Can prepare breakfast." Finally, each subobjective is measured on a scale from one to nine. The result is a wealth of information stored on each client.

ACDC is hoping that this information can be converted into at least a modicum of meaningful life skills for its 62 clients.

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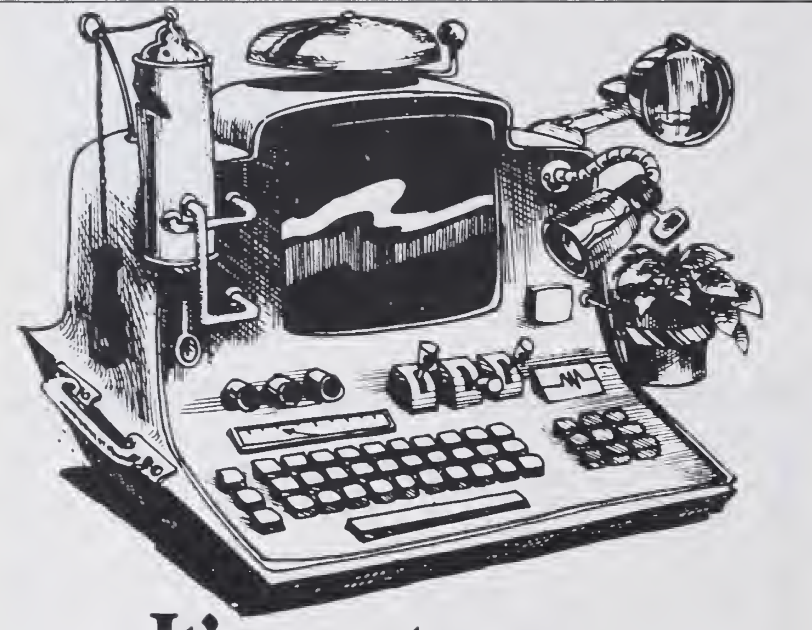

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Calendar

April 1-3, Washington, D.C. — **The Advanced Data Base Course.** Contact: Eastern Technical Associates, Inc., 20 Wells Ave., Newton, Mass. 02159. Also being held April 22-24 in New York.

April 3-4, New York — **Making Data Bases Work.** Contact: James M. Adams, Greater New York Regional Conference, Association for Computing Machinery, 1133 Ave. of the Americas, New York, N.Y. 10036.

April 8, Waltham, Mass. — **Production Control Seminar.** Contact: Value Computing, Inc., 300 VCI Building, W. Marlton Pike, Cherry Hill, N.J. 08002.

April 8, Providence, R.I. — **American Production and Inventory Control Seminar (APICS).** Contact: APICS, c/o Nyman Manufacturing Co., 275 Ferris Ave., East Providence, R.I. 02916.

April 9, Cambridge, Mass. — **International Electronic Mail Symposium,** Contact: Value Computing, Inc., 300 VCI Building, W. Marlton Pike, Cherry Hill, N.J. 08002.

April 21-23, Albuquerque, N.M. — **Western Computer Conference.** Contact: E.Z. Million, P.O. Box 950, Norman, Okla. 73070.

April 21-25, New York — **Performance Reporting Instrumentation and Work-Load Forecasting.** Contact: Institute for Software Engineering, P.O. Box 637, Palo Alto, Calif. 94302.

April 28-May 2, West Lafayette, Ind. — **Image Processing and Pattern Recognition.** Contact: Purdue University, Stewart Center, West Lafayette, Ind. 47907.

April 29-May 1, Anchorage, Alaska — **All Alaska Conference.** Contact: Data Processing Management Association, 7101 Debarr Road, Anchorage, Alaska 99504.

April 30-May 2, Lake Buena Vista, Fla. — **Third-Party Lease Negotiations Course.** Contact: International Computer Negotiations, Inc., 1331 Palmetto Ave., Winter Park, Fla. 32789.

April 20-May 2, Wellesley, Mass. — **On-Line Systems Design.** Contact: Q.E.D. Information Sciences, Inc., 141 Linden St., P.O. Box 181, Wellesley, Mass. 02181.

April 30-May 2, Liverpool, England — **Mersey Micro Show.** Contact: Online Conferences Ltd., Cleveland Road, Uxbridge, England UB8 2DD.

May 5-9, Los Angeles — **CICS/VS Application Programming-Command Level.** Contact: On-Line Software International, 65 Rt. 4 E, River Edge, N.J. 07661.

May 5-16, Morristown, N.J. — **Basic Data Communications,** sponsored by Data Communications Institute. Contact: McGraw-Hill Conference & Exposition Center, Room 3677, 1221 Ave. of the Americas, New York, N.Y. 10020.

May 12-13, Arlington, Va. — **Data Communications Architecture, Interfaces and Protocols,** sponsored by *Data Communications* magazine. Contact: McGraw-Hill Conference & Exposition Center, Room 3677, 1221 Ave. of the Americas, New York, N.Y. 10020.

May 12-14, Boston — **Computer System Performance Evaluation.** Contact: Institute for Science and Public Affairs, 1370 Ave. of the Americas, New York, N.Y. 10019

DP Education Most Noted Problem

Turnaround Time

By Larry E. Long

In the very first "Turnaround Time" column, a reader asked, "Of all the pressing problems and issues in DP, both present and future, which one do you feel to be the most critical?" I turned the question around and, offering a list, asked *Computerworld* readers which three problems they feel are the most pressing.

Approximately 80% of the responses came from management personnel in the information services area — from project leaders to directors. The other 20% of the responses were sent in by systems analysts, programmers and user managers. Many of the respondents not only listed the top three issues, but also included justification for or a general comment about a particular issue.

Several of the respondents mentioned that the issues and problems are highly interrelated and that a change in one will usually affect several others. This point is well taken, and we should keep this in mind when defining possible alternative solutions.

Listed by more than half of the respondents, *DP education* was mentioned among the top three problems more often than any other issue. Ironically, however, not one person ranked DP education as the premier issue.

Though not specifically mentioned by any respondents, "career development" is sometimes used incorrectly as a synonym for "DP education." Even if this interpretation skewed the results, DP education is still a critical issue.

Rapid change in technology, DP management and *personnel retention* ran a dead heat for second through fourth, with each ranked No. 1 by numerous persons.

A distant five and six were *standards and procedures* and *documentation*, respectively. It has always been my opinion that documentation should be incorporated as parts of standards and procedures. Stacks of standardized documentation forms have little meaning if not supported by standards and procedures.

Several respondents conbined standards and procedures and documentation into one category, so I'm not alone. If tallied together, the combination would have topped DP education.

There was a significant drop in the number of mentions for the remainder of the issues. In order of importance, they were *user interactions, privacy, security, productivity, internal image* and *certification*.

On the importance of DP education, one reader wrote, "Continuing education is for everyone: professionals, managers and support people. Very few people are so self-directed that they seek out educational opportunities to improve their skills. Such opportunities must be brought to them even if they aren't sure they want to participate.

"We either grow or we start to slip behind. There is no standing still, yet most companies hire the best people they can find, reap the benefits of past education and experience and provide no new knowledge to their people. This must change if a work force is to remain motivated and productive."

All DP education coordinators who submitted responses noted DP management as one of the top three problems, along with DP education. This might be an indication that DP management is not convinced of the need or worth of DP education.

One respondent noted that "DP education should also include education of user management and analyst." Another added, "When users don't understand, costs go up as the resulting software is reworked to make it acceptable."

On the rapid change in technology, one reader wrote, "It has caused serious problems in all areas of DP." Even with the accompanying increased potential, this rapid change is wreaking havoc in the DP industry.

The rate of change in technology is greater than that of our ability to cope with these advances in hardware and software.

— — —

Q Could I suggest that you use "Turnaround Time" to investigate standards and procedures and documentation? Would you ask your readers for their comments on the various design or documentation methodologies or strategies available — how well they work, how long they took to install and be used effectively, why they didn't work and how they failed?

A I agree that this information would be valuable to the DP community and would like to invite readers to respond to one or all of your questions. I will compile and print the results with reader comments.

Next week, We'll look at readers' thoughts on DP management, personnel retention and other critical issues in today's DP environment.

Have a question? Send it to Larry Long, Editorial Department, Computerworld, *375 Cochituate Road, Rt. 30, Framingham, Mass. 01701*

Long is a professor at Lehigh University, a DP consultant and author.

Why do you think they call it a dump?

dump/A dull, gloomy state of the mind, low spirits . . . A thick, ill shaped lump or hunk of anything . . . To deposit something in a heap or unshaped mass, as from a cart.

Webster

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EDITORIAL

When IBM Speaks . . .

Last week promised to be a momentous one. Many IBM watchers had predicted a big announcement from IBM — perhaps a 4351 — and every hardware editor was on his mark to rush the story into print.

As readers might expect, *Computerworld* contacted IBM, but there was to be no announcement. Could it possibly be that the system was not ready? Were all the IBM watchers wrong? Maybe IBM was just tweaking the DP community because there had been so much advance publicity?

Nevertheless, CW watched the business wire religiously and each morning rushed to open the mail. That's how IBM announcements come most of the time — one or two pieces of paper in the mail, no hoopla, no news conferences, no multimedia presentations.

But no news came.

By week's end some CW staffers were feeling a little foolish. Nevertheless, that exercise emphasizes an important message. IBM's decisions affect more and more people's DP spending decisions and more and more people's jobs and livelihoods. And the percentage of users affected by IBM is growing rather than shrinking — largely because of the success of the plug-compatible mainframe manufacturers.

In 1979, for example, IBM shipped 65.5% of the general-purpose computers and their related peripherals — a market share that in any other industry would be considered startling. But when one adds Amdahl Corp.'s 2.3% share of the market, National Advanced Systems Inc.'s 1.1%, Magnuson Systems Corp.'s .1% and the compatible peripherals manufacturers' 5.4%, one finds that IBM's decisions affect 74.5% of the nation's users.

The balance of 25.5% is shared by Univac, Honeywell, Inc., Burroughs Corp., NCR Corp., Digital Equipment Corp. and Cray Research, Inc.

To borrow a line from E.F. Hutton — when IBM speaks, *everybody* listens.

DATA PAST

Five Years Ago
March 26, 1975

ROSEVILLE, Minn. — Univac replaced plated wire and core memory in the 1106 and 1110 CPUs with semiconductor memory to increase speed and reduce cost. This renovation resulted in the 1110/20 and 1110/40 CPUs, which reflected faster semiconductor memory speeds in faster throughput at a somewhat lower cost.

— — —

NEW YORK — Dennis Muenzer, director of management information systems for the Ideal Toy Co. of Hollis, N.Y., told Computer Caravan attendees here that bargain basement-priced IBM 360s could be just the answer for DP shops with shrinking budgets. "We found the market for 360s to be so favorable. . . that from a dollar standpoint alone the justification of a 370 was nearly impossible," Muenzer said.

Eight Years Ago
March 22, 1972

DENVER — The Tenth Circuit Court of Appeals ruled here that a company is responsible for the actions of its computer system and must live by those actions. State Farm Mutual Automobile Insurance Co. had argued it was not liable under a canceled insurance policy even though the policy had been automatically renewed by the firm's computer system.

But the judge disagreed: "The reinstatement here was the direct result of the errors and oversights of State Farm's human agents and employees. The fact that the actual processing of the policy is carried out by an unimaginative mechanical device can have no effect on the company's responsibilities for those errors and oversights."

— — —

BOSTON — The federal district court here was asked to rule on a class action suit charging that Federal Bureau of Investigation maintenance and dissemination of incomplete or inaccurate criminal identification records violates the Constitution. Paul Cowan, who claimed he lost his job through false records contained in the FBI's data bank of criminal records, filed the suit here claiming that such data bank information violates the First, Fourth, Fifth, Ninth and Fourteenth Amendments of the Constitution.

LETTERS

Mistaken Identity

In a spontaneous and very much unrehearsed interview granted to a representative of *Data Management* magazine (and reported on in "Soviet Military Use of U.S. Computers Reported" [CW, Feb. 25]), I made a mistake when I quoted a newspaper story reporting the use of a U.S.-produced computer for the improvement of the Soviet Backfire bomber. Because of failure of my memory, I connected the Soviet Backfire bomber project with the computer delivered for the 1980 Summer Olympic games.

The story I was quoting told of the Soviet misuse of another computer. I apologize for this mistake.

Let me add a few words of comment. I quoted the then-recent newspaper report not to pinpoint a U.S. producer for criticism. The context of the interview clearly confirms that the emphasis was put on the overall policy in matters of transferring technology to the Soviet Union, not on this or that industry, this or that producer. In a free society, with division of political and economic power, it is the duty of the government to establish policies of international trade, tariffs, even of embargo. The criticism was addressed to the authors of these policies, not to the producers of computers.

L.G. Hale
Director Of the MBA Program
Dean of Students
Graduate School of Business
University of Chicago
Chicago, Ill.

IBM System Not Invoked

I am writing to set the record straight about "Soviet Military Use of U.S. Computer Reported." The article included an erroneous statement that IBM equipment for the Summer Olympics has been used for work on the Backfire bomber.

We have talked to the person who made that statement in an interview with *Data Management* magazine and he said he made a "serious mistake" in linking equipment installed for the Olympics to allegations about such work.

Victor J. Goldberg
Vice-President
IBM
Armonk, N.Y.

No Purveyor of Snake Oil

This is not to take issue with John K. Taber's statements opposing the need for more computer crime legislation in "DP Crime 'Bogus Issue.' " In that, Datotek concurs.

However, some of the statements made or quoted by Taber and as presented in your article have the effect of labeling any firm connected with computer security as a "purveyor of snake oil."

Since there are several kinds of businesses that deal with computer security in one way or another and since, unfortunately, Taber did not differentiate among them, Datotek would like to take exception to the tone of the article.

The people at Datotek have worked hard over the last 10 years to build an excellent, worldwide reputation as a leader in communication security. Some of these products apply to computer security (data communications).

It is a reputation that is extremely important when selling products of such a sensitive nature.

We would simply like to state, for the record, that Datotek does not use "scare tactics" or sell "gadgets." We provide quality products to those who need them. We are proud of our accomplishments, and of the respect we enjoy from our customers.

D.R. Whitson
President
Datotek, Inc.
Dallas, Texas

AT LARGE Rex Malik

Long Road Ahead for DP In Developing Nations

Two weeks ago, we set out to look at the question of computing in developing countries and the aid that could be given them through bilateral deals, properly formulated and aimed at the long term. The discussion centered around some specific proposals presented recently by Julian Bogod, president of the British Computer Society.

In this article, I want to look more closely at the situation in the developing countries and at the problems that are the focus of Bogod's proposal.

Why is it so difficult to establish computer systems in developing countries? Successful implementation of computer systems is dependent upon there being a systems infrastructure on which to build. And by that, I do not mean that the country must have access to computer systems skills in sufficient numbers; I mean something much more basic.

For example, taxation systems in the West work comparatively efficiently because they have been built up over the years and individuals, companies, banks, accountants and so on accept the rules and procedures and know how to work them. Where these rules and procedures do not exist or are inefficient, it becomes difficult if not impossible to devise a computer-based system to meet the national requirement. (Even where the society has proven procedures, a computerized switch from one form of taxation system to another can take years.)

Of course, in countries at the basic level of computing development, there is nothing to prevent an organization from setting up internal disciplines and thus providing an environment in which some automation of functions can proceed. And this is what happens: independent systems are built, which sometimes interact with those of parent organizations in other countries.

But there remains a barrier against the establishment of interdependent systems within the country. How much can be done is determined by the pace of social change, not by that of technological change. Governments can only impose change if they are willing to accelerate the pace at which the society develops.

Massive Education

To get where we are requires massive education at five levels. There is first a level of general education that will prepare the population to participate in a system-based culture. There are still doubts that any of us have managed that very well as yet.

More practically and more easily identifiable, a level of general education is required to provide a pool of trained minds from which the country can obtain its computing practitioners.

Next comes the higher education to turn those trained minds into computer professionals, followed by a

(Continued on Page 32)

HUMAN CONNECTION/Jack Stone

'Distributed' Training Needed for the '80s

The revolutionary movement of processing function out of the DP departments into the user establishment suggests some rethinking on training needs and systems in the coming years.

First let me address the subject of DP training for users. The ever-widening distribution of terminals, minis and micros has brought about a vast increase in the number of nontechnical users who interact directly with computing facilities and services. These users — along with their supervisors, managers and executives — should be scheduled into a properly planned training program, one which deals with the theory, operation and application of systems at instructional levels appropriate to their tasks and is flexible enough to handle new information as systems change.

This article is 11th in a series, "DP Management in the '80s."

The traditional classroom replete with blackboards and live instructor with chalk in hand has some serious limitations for many organizations when they consider it for training users. First of all, with this approach, the sheer magnitude of the training requirement implies a major commitment of resources which are in short supply — particularly, rooms and people — a commitment which is not terribly easy to obtain from offices these days. Then, too, delivering systems training through interactive hands-on experiences at user consoles — as the primary training methodology — can be far, far more effective and efficient than lectures for reasons I trust we all know. In addition, it's no easy matter to take a large group of users away from their jobs for extended periods of time.

The point is that conditions are ripe for accelerated growth in the automation of the training function, including its delivery in a manner in which content, presentation, style and schedule are selected by the individual trainee. This is what John DeAno, President of Advanced Systems, Inc. (a vendor of training materials and systems from Arlington Heights, Ill.), terms "distributed training." In a recent letter to me, he stated his belief that business, economic and technological conditions of the '80s will give rise to its rapid growth, and he noted that his firm — which currently offers delivery systems in the form of combinations of video, audio and

(Continued on Page 30)

READER COMMENTARY/Kathryn A. Young

Understanding Defuses Contract 'Land Mines'

Paul J. Ostling's statement that vendors "land-mine" their agreements ["Beware of 'Mined' Contracts, Attorney Warns", CW, Jan. 28] might give one the erroneous impression that vendors try to hide unfair clauses by "burying" them in their contracts or that vendors intentionally try to get the better of their customers. Perhaps Ostling's use of the term "land mine," a hidden, destructive device, was not meant to be taken seriously, and perhaps the analogy was used only for a little bit of color and as an attention-getter.

On the other hand, perhaps Ostling was making a very serious accusation regarding the honesty and fairness of vendors' contracts. If he meant to say that unfair provisions are hidden in many vendor contracts, then it is time to set the record straight.

Ostling's advice that the user should have its legal counsel inspect any significant purchase agreement before the document is signed is obviously sound. However, his suggestion that the user beware of the vendor "ploys" of including in their contracts an integration clause, and exculpatory clause, an indemnification clause and a waiver-of-warranties clause needs to be put into perspective.

An integration clause is included in almost every complete contract and is neutral on its face. This type of clause only says that the complete agreement of the parties is incorporated into the contractual document. This clause does not favor one party to the contract over the other; it protects both parties equally from claims of the other party that there were any "side" agreements not included as part of the contract.

The vendor is understandably trying to avoid these liabilities — the perpetual obligation to repair and the possibility of being sued for breach of contract for repairable defects. The main motive is to be able to keep prices down.

Exculpatory and indemnification clauses (also known as "limitation of liability" clauses) protect the vendor from the possibility of having tremendous liability following the failure or misuse of its product. At first glance, this may seem unfair to the user, but one must consider the unique role that computer hardware and software play in business and technology. A very minor software "bug" or hardware failure can have far-reaching consequences, and because of the complexity and sophistication of the hardware or software, such bugs and failures are almost inevitable.

Knowing that such bugs exist, a vendor who agreed to pay for any damage caused by them would have to raise its prices considerably to compensate for the possibility of having to pay more in damages to the customer than the vendor received from the customer for the products in the first place.

This is not a case of an innocent consumer being sold a "pig in a poke" by the big, bad corporation. This is a case of a corporate consumer (and its attorneys) knowingly assuming a risk associated with high-technology products.

The waiver-of-warranties clause is generally used in conjunction with a limited warranty clause. The limited warranty clause states what the warranty is, and the waiver-of-warranties clause states that all other warranties are excluded. If this waiver-of-warranties clause were not included, the law under the Uniform Commercial Code (UCC) would imply additional warranties.

A typical limited warranty clause will state that if the system doesn't work, the vendor will repair or replace it at no charge for a limited period of time (such as one year). If not excluded, the warranties under the UCC might give the customer the right to have the system repaired at no charge in perpetuity!

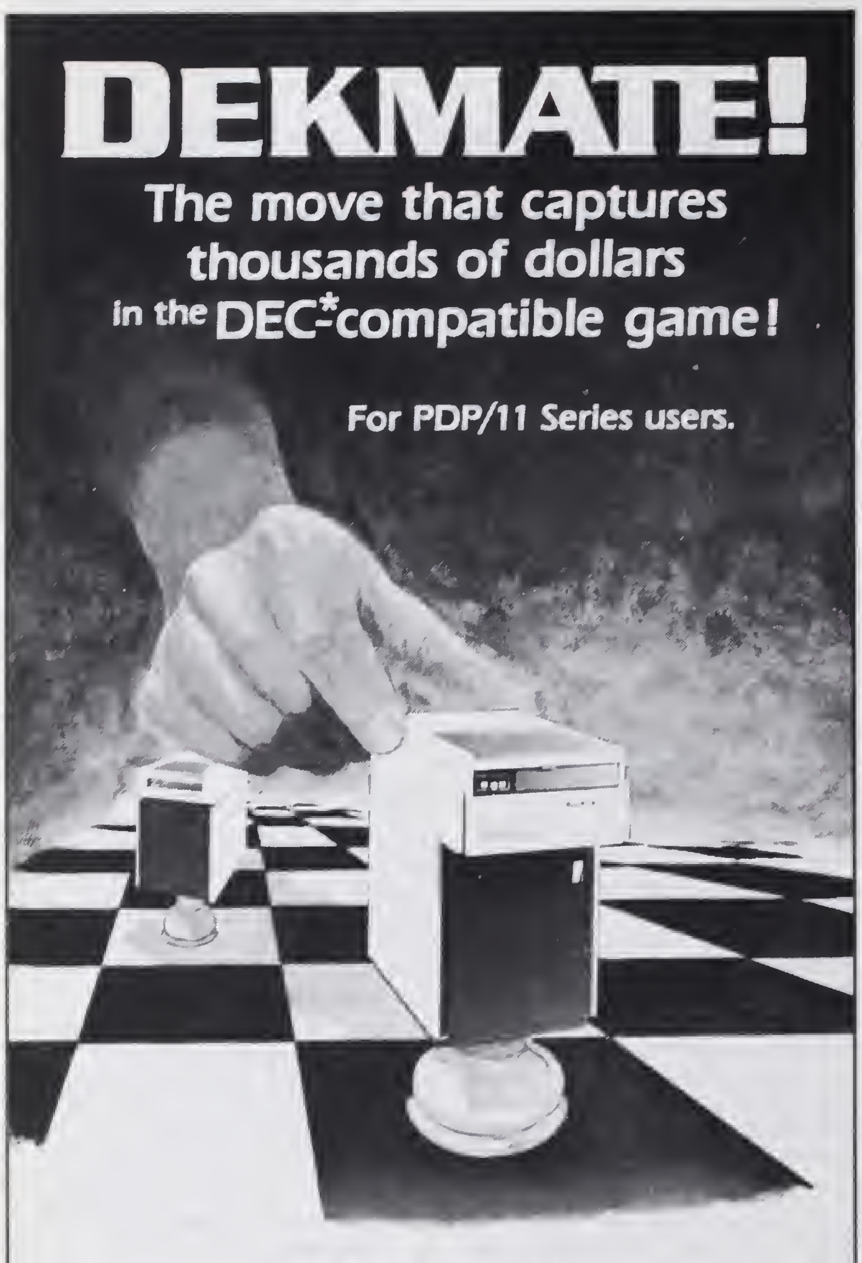
Minor Kinks

The UCC warranty also might give the customer the right to sue the vendor for breach of contract in the event that there was a repairable defect in the system, and we all know that practically all systems, because of their complexity and sophistication, have some minor kinks that can be ironed out.

It is these liabilities — the perpetual obligation to repair and the possibility of being sued for breach of contract for repairable defects — that the vendor is understandably trying to avoid. Again, the main motive is to be able to keep prices down.

Every contract for whatever purpose should be legibly printed and should be reviewed. Limited warranties and limitation-of-liability clauses should be read and understood and any risks should be knowingly and willingly undertaken. But if users insist on drafting their own warranties and expanding the vendor's liability, as Ostling suggested that they do, then users should be prepared to pay a much higher price for the products they buy.

Young is a legal assistant with Informatics, Inc. in Woodland Hills, Calif.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AND IN THIS CORNER

Kenniston W. Lord Jr.

Murder by Computer: A Frightening Possibility

Four years ago, I wrote about using the computer to commit murder and was dismissed as a wild-eyed radical. Since Donn Parker has now made discussion of the topic respectable, I must once again enter my two cents.

Parker is most certainly correct in his assessment that purposeful murder could be committed using the air traffic control (ATC) system. I stated that in my articles, though my perspective on the problem was somewhat different — I theorized that a person so committed could run two jumbo carriers together. I'm still convinced that it's possible. And I'm further convinced that merely saying that it might be impossible is not sufficient.

But "murder on the ATC express" is certainly not the only way purposeful computerized genocide could be committed. In my earlier series of articles, I advanced the premise that a programmer who believed in euthanasia could commit such using a computer primarily designed for patient monitoring systems. I theorized that systems used to combine drugs could be used to kill people on a random and nearly untraceable basis.

It would take very little brainstorming to augment the list: traffic control systems in high-speed train control; flow systems in petrochemical processing; and on and on. And before I get branded once again as being somehow *non compis mentis*, I challenge the reader to do a little brainstorming on his own and to present that brainstorming here, along with some potential solutions.

I'm excited about what I can see to be the potential for human beings via the microcomputer. I can foresee the time when a microcomputer will be implanted into a defective human brain to assist in the tasks of information retrieval, sight, speech, and motor-dexterity. It may well be that with the microcomputer we will indeed have the power to cause the blind to see, the deaf to hear, the dumb to speak and the lame to walk. I don't have the slightest concept how that will happen, but I firmly believe that given the capability, knowledge and compassion of man it can and will occur — perhaps within my lifetime.

But at the same time, I'm fully aware that those who would misuse computers may be in the position to wage a reign of terror. And I see little being done about it by those whose insight into the problem must be larger than mine. I saw it in 1976 and 1977, and I see it in 1980. Do you see it as well? If you do, what do you think should be done about it?

Different Training Needed

(Continued from Page 29)

textual materials — is looking at computer-based systems in the long range.

DeAno pointed out that "the growth of data processing complexity will require more training, not only for the experienced DP professional but for those new to the field and, more important, for the end user. This growth in complexity can be seen not only in the breadth of advanced technologies such as data communications, networks, data base, distributed processing and office automation, but in the depth of skills required for each. And more depth is being required in traditional areas such as operating systems, computer languages and the 'newly traditional' area of the structured technologies."

He went on to say that "audiences requiring technological training have proliferated and now include those with such titles as 'designer' and 'programmer-analyst.' And training now must be available for the supervisors, managers, executives and users who find themselves trying to meet overall objectives with technological tools.

"Furthermore, the increased rate of change in applying DP to productivity issues will demand that instruction be continually upgraded and provided at the current state of the art. In addition, training must be more convenient — offered where users want it and when they want it."

But proper training can do more than build technical skills. DeAno wrote, "Training can increase the professionalism of the people who work with the computer or who are affected by it, and that means a higher level of skills training. Low turnover contributes mightily to productivity, and training is a proven method of increasing job satisfaction and keeping good producers."

And cost-effectiveness considerations are important, too, he concluded. "One measure of a cost-effective training program is its ability to reach that broad range of technological areas affecting several audiences at various levels. This is where technology is coming to its own rescue. The distributed training concept is taking advantage of a variety of technologies, old and new, to meet the often massive training requirements that technology has imposed."

LETTERS

'Priceless Gem'

I'm writing to thank you for the priceless gem which appeared in "Documentation: Analyst Offers Practical Tips" [CW, March 3]. Every analyst has a tool box of techniques with which to work and I was elated to be able to add Brian Mullen's "practical tip" to my resources.

Here it is for those of you who missed it: "As a general rule of thumb, Mullen said, users can expect to generate about a foot of documentation for every $25,000 worth of software."

My only question is this: Shouldn't we measure our documentation in meters rather than feet?

Tim Hall
Madison, Wis.

LETTERS

Cart Before the Horse

While I agree with Jack Stone's assertion that the DP function should ideally be a vice-presidential position, I cannot concur with either the rationale or the methodology he advocates [''Reorganization Should Give DP More Clout,'' CW, Feb. 11].

To justify the placement of DP at a vice-presidential level, Stone cited the lack of respect afforded the information systems function. Further, that lack of respect, in his opinion, stems from the differing ''attitudes, interests and professional goals'' held by DPers-at-large. Worse yet, Stone insisted that those interests are becoming increasingly divergent as systems have become more complex.

To correct this ''lack of respect,'' Stone advocates the elevation of DP to a vice-presidential position. He asserted that the marketing function is important ''in great measure because there is a vice-president for marketing.''

Stone has the cart before the horse. There is a vice-president for marketing because the function is important. Merely establishing a vice-presidential-level position for a function does not make it important or afford the function respect (witness the vice-president, personnel).

DP will get a ''fair shake'' only when it establishes itself as a contributor to the interests or goals of the business. A fair shake is something that is earned, not awarded.

It will do little to establish a vice-presidential position until DP proves that it can contribute to a business, and that won't happen as long as DPers' ''attitudes, interests and professional goals'' differ from those of their business counterparts.

In short, a vice-presidential position for DP is justifiable when DP proves itself worthy of such ''respect.'' The complexity of systems has nothing to do with the divergence of interests. That's a holdover from the days of DP as a mystical and arcane art, a holdover which we must quit hiding behind.

If we want organizational stature, we must make the DP function an integral part of the business, one that is understandable to other parts of the organization and one that assists the business in achieving its goals. Then, and only then, is a vice-presidential position justifiable.

Alexander Grant
Reno Nev.

SNA Vs. Free Society

The designers of IBM's Systems Network Architecture (SNA) have produced a technical marvel, truly a wonder to behold, but there cannot have been a single philosopher or statesman among them, unless of Marxist persuasion.

SNA is an absolute dictatorship. The master mainframe dictates which of the commonality may speak to each other, and when and how, and keeps a record of every conversation. Because failure of the CPU or a vital communications link could make it impossible for anybody to talk to anybody, the designers added the Advanced Communications Facility, which permits the system to swap dictators. Nobody knows how much CPU time and other grief that might cause.

The philosophy is wrong, in spite of fine technical components.

Recently I became acquainted with a modest yet ingenious little program whose philosophy is right. It is a freebee to license-holders of IBM Series/1 CPS Virtual Cobol and incorporates many of the facilities I should like to see in distributed systems.

With it you can access files on other Series/1 minicomputers, execute jobstreams and do almost anything you can do on your own machine. It is so powerful, in fact, that what it needs most is a protection mechanism to prevent one user from wiping out everybody else's files and so forth, but that will come.

The point is, in this little program we have the basis for distributed processing on a human level via simple contention for resources—in other words, a free society.

What the designers of distributed processing systems seem not to understand is that they are playing the roles of a Jesus, a Solon and a Douglas MacArthur, determining the ethics the world will live by, the laws it will live by and the constitution it will live by. The protection of individual privacy and liberty is possible only in a contention network.

We are all going to enjoy some of the technical benefits of SNA, X.25 and what have you, but it behooves us to realize we are creating a human environment, not just another tool.

Distributed processing is not merely a technical problem. It implies a reorganization of human society, and those of us in any way responsible for the results ought seriously to ask our selves what we are about.

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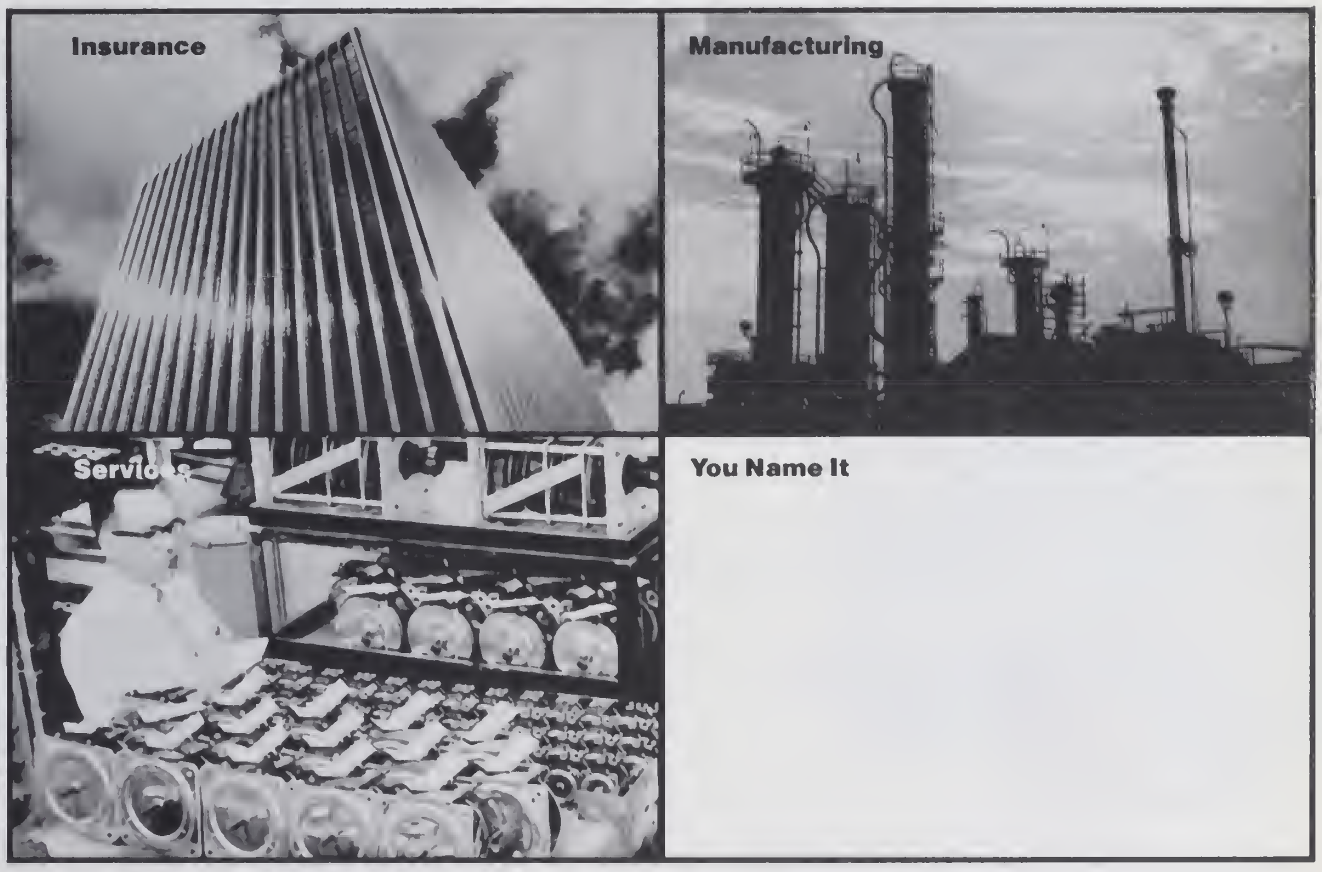

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DP in Developing Nations: A Long Road Ahead

(Continued from Page 29)

level of management education that will enable those computer professionals to be properly used. And then last, a country needs the apparatus to provide technical education to produce and mature systems analysts, programmers and engineers.

And even with all these things, the gap between the developing and the developed can be wide and may indeed be widening. Algeria is one of the few developing countries with a coherent national plan for education in computing. From 1985 onwards, it will be training 450 DP managers and systems analysts, 300 programmers, 100 operators and 70 maintenance engineers each year, and about 400 computer professionals will receive short courses.

By contrast, Japan is implementing a vast education program. This year it expects to provide nearly half a million university or college students with DP education, while also providing public education through the television system.

In making his bilateral proposals, Bogod said, "It seems likely that the technology gap can never be bridged. The cost of setting out on a technological development path and catching up with the world leaders would be outside the capability of practically any nation.

"This does not mean that a country should not attempt to carve out a particular area of technological leadership, but there must in the future always be some major dependence upon the most advanced nations."

So what help can be given? Certainly there is some overlap between what we do and what needs to be done in the developing countries. But we are not the same, and this affects the transferability of software.

Major Needs

We can list four major needs of the developing countries. I write of the public sphere, for this is where the contrasts are sharpest and the real differences in priority exist.

- Development and exploitation of natural resources. Many developing countries have immense resources available and an enormous task in realizing them. This leads to planning, project management and control, and scientific research and analysis requirements, as well as continuing management once the resources are brought into use.
- The obvious problem of raising educational standards. The volume problems here are immense.
- Raising the standards of health care. Most of the developing countries have tropical or semitropical climates with consequent endemic and epidemic diseases.
- Increasing food production. Vast numbers of the world's population are below the bread line. That is a fundamental barrier to national development. The problem of raising output leads directly to national planning: there is no other way in the short term. And even the short term can take a long time, during which people can still be below the starvation level.

It becomes obvious that although computing is an integral ingredient of development, computing itself probably comes way down the list of things that a developing society will think about.

Bogod's proposals could help to change this at least for some. The UK already has experience in bilateral dealing with two countries. The first of these is Greece, which cannot be called underdeveloped but is still not advanced. There, having done a large amount of joint study, the French eventually moved in at cheaper prices.

More interesting has been the Mexican experience. A UK delegation visited Mexico in 1978 to hold a conference on computing in government for a Mexican government audience. The UK delegation was led by British government representatives and included representatives from our major manufacturer, International Computers Limited, the UK services industry and the National Computer Centre.

Yet there still has been no significant progress towards closer cooperation between the two countries. This is not because the U.S. is next door and is actively doing something about it. Bogod, who was on the visit, thinks the reasons for the lack of follow-up were these: a shortage of coordination and planning in preparation for the visit and a lack of follow-up and direction by the UK government. This is understandable, as government bodies are not normally empowered to take initiatives in this kind of activity.

Improvement is not going to be easy. And working through the United Nations or one of its specialized agencies is going to be a very slow, diffuse process in that aid will get spread thinly.

I believe that Bogod has made a case for doing something different. What we need are some shining examples of helping people to help themselves.

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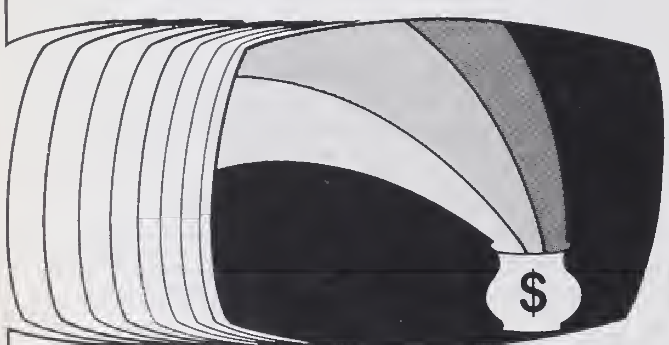

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THE TAYLOR REPORT/Alan Taylor

Terminal Users Can Bring Noise Causes to Light

Noisy terminals have come in for more and more attention as terminals have moved into the ordinary workaday world. Yet just what makes a terminal satisfactory from the noise point of view is a highly intricate subject in which few integrators have much background. Despite the fact that knowledge in this area can be important for customer satisfaction, an examination of present-day terminals would indicate an almost equally pervasive ignorance on the part of most terminal manufacturers.

Without being an acoustic engineer, any integrator or user can distinguish between terminals that control noise and those that merely include a few foam rubber inserts. It only takes a few minutes and requires no more equipment than a flashlight. Moreover, noise test should not only be part of the terminal selection procedures but also part of each terminal's acceptance test before it is placed on-line. The tests can also be used periodically during routine terminal inspections.

Noise Sources

There are two major sources of noise in most printing terminals — one or more fans and the printing operation itself, using whatever printing mechanism is provided. The noise from these sources escapes to the outside either directly through holes in the case or indirectly after being reflected internally from some part of the case.

The most serious current deficiency of all terminals is in allowing unnecessary direct escape of noise. This occurs through:

- Deliberate holes to let paper in and out, for ventilation and so forth.
- Thin covers, particularly Plexiglas windows in paper reservoirs which may be paper-thin.
- Careless holes where the pieces of the terminal don't fit tightly, as in the corners of the cover or around the switches or other controls.

All these noise holes can be found simply by letting a flashlight shine inside the closed terminal cover and observing the result. (Darkening the room can help find some of the less obvious ones). Any beam of light, except through a thick piece of Plexiglas, is an open noise source which should be treated. Holes that come from poor assembly quality control should be put right by the manufacturer, and those that are intrinsic in the design of the system should be counted against the system in the selection process. In use, they should be guarded against as far as possible.

Avoiding Direct Noise

The key to selecting a terminal for direct noise considerations is to realize that paper is a major conductor of noise and that noise can be controlled simply by putting boxes or baffles between the source and the outside, thus converting it to mostly indirect noise.

It does not take very intricate boxes or baffles to do the job. In fact, almost anything that will stop the flashlight beam will cut the direct noise substantially. However, watch for thin Plexiglas, particularly on paper reservoir covers.

Paper reservoirs or covers do not have to go right down to the floor. Although paper does conduct both the fan and the printing noise vibrations and releases them as noise well away from the noise source itself, the power of the released noise appears to diminish very much like light; an apron of about two feet covering the paper intake and outlet paths, if directed away from where people will be in any direct line of hearing, is often sufficient to control noise.

Indirect Noise

Noise that has been intercepted and reflected back inside the mechanism becomes important only when the holes which let out the direct noise have been treated or neutralized. Foam rubber, which does a poor job of protecting against direct noise, greatly helps to control the reflected indirect noises. The most effective control I know for such noises consists of foam rubber mounted over a coat of sound-absorbent Smart paint, which contains millions of minute glass balls.

Retrofitting noisy terminals to protect against indirect noise currently seems unimportant, since most of the noise pollution is being let out from the units directly. However, in evaluating units that do show signs of having been acoustically designed, make a point of searching for the indirect noise control planning. After all, the direct noise you now are preventing from escaping has to be handled somehow, and you don't want the whole case giving off a low-level resonation as the method of disposing of the trapped noise.

Don't forget the flashlight test later in the life of the printer terminal, either. Corners can come askew and parts or moldings can come off in operation without anyone noticing.

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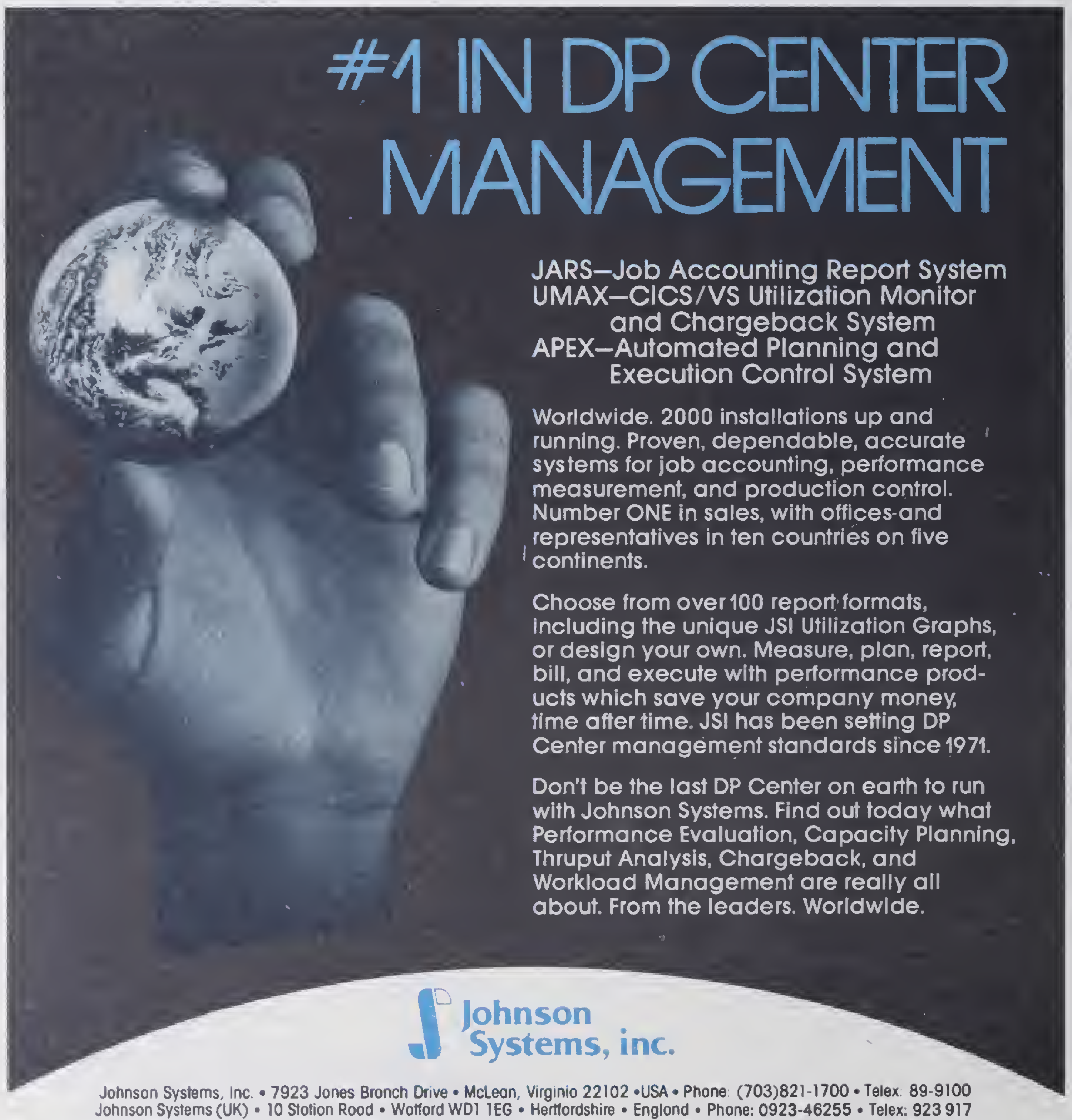

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READER COMMENTARY/Jack O'Connor

How Good Is Your System Success Ratio?

Are your DP systems successful or a disaster? We all have some of both types, but there is a way to increase the ratio of good to bad systems you will install in the future.

Before you can rate the probability of success for a new system, you must have a base against which to measure that probability; that is, what is a successful system? First, it *saves money,* but even the best system in the world won't save a nickel unless it is *used.* The most successful systems are used *repeatedly.* The period of use varies from minute-to-minute order entry, daily inventory, weekly payroll, monthly general ledger, all the way up to annual federal reports and beyond. These systems survive the *test of time.* They stay in use over a period of several years.

For someone in your organization, they *save time and energy,* which enhances productivity for the user.

If you can observe all of these elements in any of your systems, you can categorize them as very successful.

Now, armed with a standard measure of success, how do you know which systems are most likely to succeed? Quite simply, they are the systems which have many of the following traits:

1. *Successful systems serve a purpose.* They are useful at two different levels in the organization. At the working detail level, they help the user do a specific business task: order material, build an assembly, pay a vendor, pay employees and so forth.

At the management summary level, these systems assist the management user in making decisions about alternate courses of future action: work overtime, hire more people, expand the facilities, lay off workers, shorten the work week and so forth. It is imperative that you distinguish between the intended users before the detail design begins. More systems will survive if the design is done by employees at the level of intended use.

Specifically, do *not* let managers design detail-level systems. They are too far removed from the detail to know what is currently most useful to the detail worker. Get those workers involved, though management should certainly review and approve the end results.

2. *Successful systems make use of the following facets of DP that function best:*

   a. High-volume activity — process many items of information in a quick and efficient manner.

   b. Calculations — summarizing, identifying, selecting exception items to be worked on.

   c. Sorting — rearranging data into a useful sequence.

   d. Data retention — storing information in a form convenient for future use.

3. *Successful systems are fairly stable because of good, flexible original design.* If the heart of a system is good, it will stand the test of time and be modified rather than scrapped and completely rewritten. That original design must be flexible enough to be enhanced at a reasonable cost at some time in the future.

The single most important design feature that ensures flexibility is record filler. Always allow 5% to 10% filler for future use.

4. *Successful systems are easy and efficient to operate.* Simple systems succeed more often than complex ones. Efficient systems are less subject to close scrutiny and are the target of fewer complaints after installation.

5. *Successful systems free employees from mundane, repetitive work and allow them time to do more appealing (hence productive) tasks.*

Failure Traits

In very basic terms, poor systems are lacking in one or more of the traits listed above, but there are some additional symptoms to watch for in order to avoid failure.

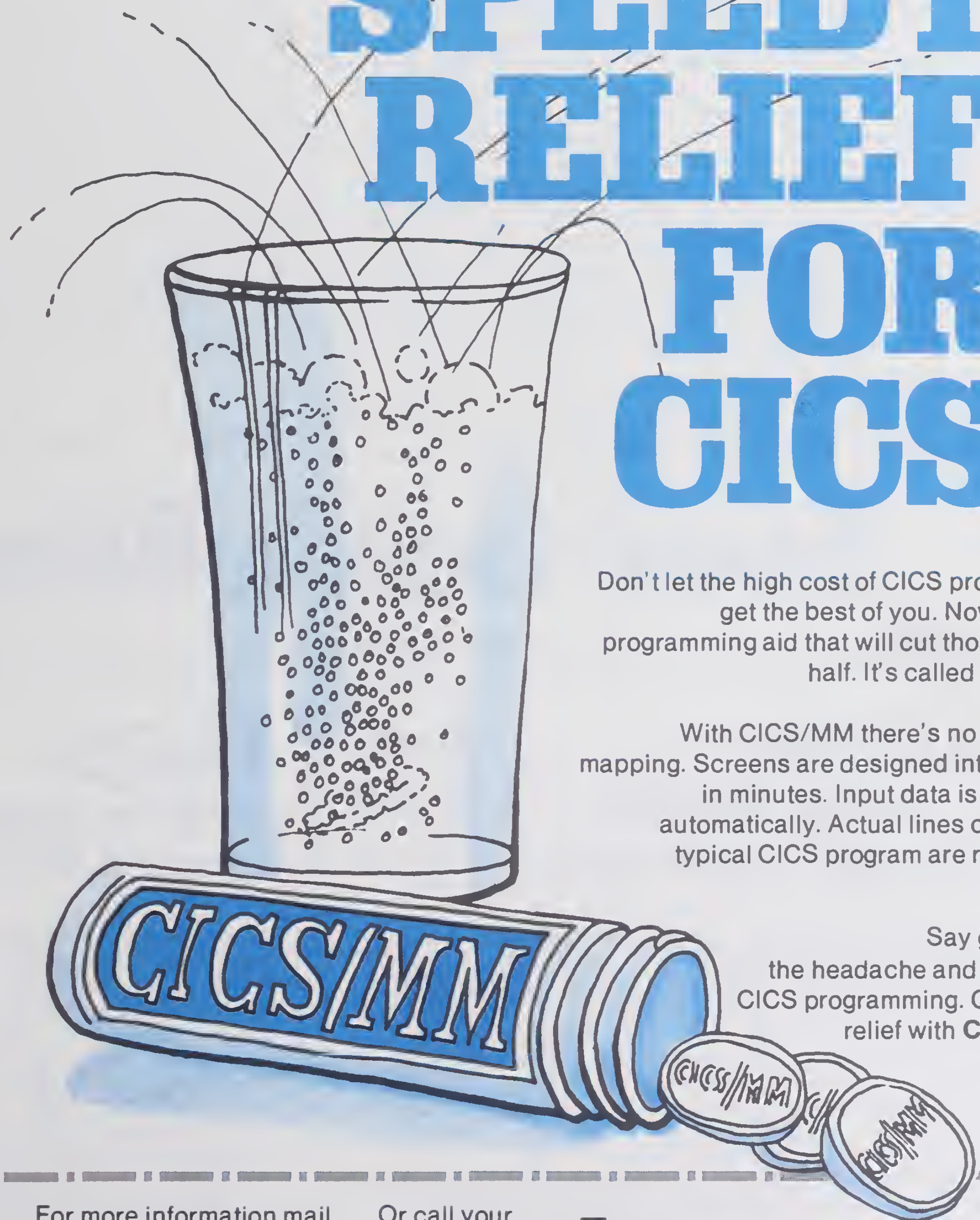
Unsuccessful, costly, bad systems fail because:

1. *They are a solution to a temporary problem.* If you design a system to ease a capacity problem on a particular machine and then buy an additional machine to ease the load, your system will die when the purchase is made. "Hot," quickie projects in DP are seldom cost-practical in the long run.

2. *They are "pet" projects.* You must fight long and hard to convince a management-level employee that his idea, although nice, doesn't have enough "positive" traits to cost-justify it. You probably have a couple of "pet" programs in your libraries that a manager with enough clout got programmed, ran once and are now gathering dust. Fortunately, only upper levels of management have enough power in the organization to get these projects implemented, so that severely limits the number of requests that get through the approval procedures without valid cost justification.

3. *They are not presented properly to the intended users.* Presentation and salesmanship do, unfortunately, have a very real impact on the success or

(Continued on Page 36)



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READER COMMENTARY/Warren Kress

Gung-Ho DPers Face Demons Along the Way

In his recent article, "The Importance of the Individual" [CW, Feb. 4], Robert Glass emphasized the potential that lies locked in the mystery of why some programmers are much more productive than others by as much as five to one.

The high-achievement programmer is separated from the mediocre by the same stuff that separates the outstanding doctor, lawyer or Indian chief. We usually describe it in such terms as professionalism and dedication. These terms are too often confused with self-sacrifice and carry visions of stubborn stick-to-it-iveness.

On the contrary, "super-coder" is enjoying himself. He has a good focus on what he likes about programming, he defends the factors he needs to maintain that focus and he indulges. The same is true of your top analyst and that dynamic manager.

If the difference can be reduced to a word, "enthusiasm" is it. Behind each of us who indulges in a home computer lies the desire to set his enthusiasm free; free to play with the computer, free of deadlines, progress reports, cost justification and perhaps most of all, free of company politics.

The challenge therefore lies in individually developing the whatever (techniques? insights? maturity?) that will allow our enthusiasm room to survive and grow. The challenge to our collective profession lies in encouraging and assisting the individual effort.

Enthusiastic rookies far outnumber the seasoned, spirited veterans. A lot of that enthusiasm never makes the transition to long-distance runner. Along the path of being assimilated into the business world, the rookie's enthusiasm is attached by demons. It's just an introduction to the continual struggle.

Here's my list of demons:

Burn-Out. Under the banner of "dedication" and the pressure of an approaching deadline marches the call to overtime. When excessive overtime becomes the norm, physical and mental exhaustion set in, enthusiasm wanes, family life suffers and everyone loses.

Underwork. Although not as common as burn-out and more difficult to sympathize with, underwork can be as destructive, attacking one's image of self worth. In the busiest installations, even highly qualified and valued employees will occasionally fall in the gap, waiting for resources to come together. Efforts to fill the gap with "busy work" can also be demeaning.

Company Politics. Here lies a collection of demons that stretch the limits of one's imagination. One common theme prevails — injustice.

There is very little mention of these demons in our professional publications. The prevailing attitude seems to accept company politics as a part of human nature that will always be with us. Managers building empires will make decisions designed to inflate their influence.

Structured programming, top-down design, walkthroughs, Warnier-Orr diagrams, Kepner-Tregoe studies — these efforts reach out to sharpen our understanding and ability to define the problems, construct efficient solutions, put them into operation and monitor their performance. A two-martini lunch should not buy influence alongside these sincere efforts.

Company politics may well be rooted in human nature but perhaps, as with the other demons in this list, frank discussion can uncover techniques for personally dealing with, or even minimizing, their effects.

Cancelled Projects. This demon has mighty big teeth and can strike without warning. It is particularly common during these recessionary times.

As for myself, I have the time to write this article because after six months of careful development, my latest project fell victim to a massive budget cut. I'm taking some time off. Now is my time to rekindle my spirit. Today I think I'll go ice fishing with a flask of blackberry brandy . . . excellent therapy.

Kress is an independent information systems consultant specializing in financial applications. He is based in Richmond, Mich.

Success Ratio Can Improve

(Continued from Page 35)

failure of some systems. The likelihood of your programmer's blood and sweat turning into implementation tears can be reduced if emphasis is placed on what the new system will do for the user, not what it will take to run it. Admittedly, the system must already be marginal if this trait can doom it to failure.

4. *They had overstated potential savings.* Disappointment at not realizing stated objectives can "turn off" users and render a system inoperable. Make sure that the planned savings are realistic before a project is started.

5. *They understated development time and cost estimates.* As time wears on and scheduled deadlines pass, user interest wanes rapidly. As costs increase, management interest heightens dramatically. So, estimate with the understanding that your estimate will come under close examination as the implementation date approaches.

O'Connor is a supervisor of DP for Grove Manufacturing Co. in Conway, S.C.

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LETTERS

A Friendly Warning

If any *Computerworld* readers are thinking about hanging a dot-matrix line printer onto their microcomputer system, I have a friendly warning to pass on to them: Pay close attention to your manufacturer's recommendations, or know the risk you're taking if you ignore them.

For example, North Star Computers recommends the Anadex DP-8000 connected to the parallel interface of the Horizon. But comparing printer specs, I chose to save a few bucks by building a Heath Co. H14 line printer for the serial interface.

I saved some money at $625 plus shipping plus an additional $82.98 at Heathkit Electronic Center in Seattle when the H14 flunked its initial power-on tests. The Heath people replaced two defective CMOS circuits and repaired three open foil breaks in the 5Y supply on the PC board at no charge, but they detected erroneous installation of seven transistors. (Considering the obvious textual errors in the documentation, which would you believe — the text or the pictorials? I guessed wrong and followed the pictorial. Customer error!)

My WH14 printer tested perfectly at 4,800 bit/sec under HDOS in Seattle. It went ape at 4,800 bit/sec on the Horizon after I got it home. A quick phone call to my friendly Horizon dealer divulged the fact that North Star DOS does not test for handshaking signals! (The Heath manual advises to run no faster than 110 bit/sec without handshaking.)

So now I have a 110 bit/sec line printer dawdling along while the 4MHZ Z-80A and I are twiddling our respective thumbs! Does anybody out there want to trade an in-warranty Anadex DP-8000 printer for an in-warranty heath WH14 plus some extra cash?

John R. Dye
Lacey, Wash.

Where Is Management?

The synergism was beautiful! Three separate pieces in the Feb. 25 issue, seemingly unrelated, together presented a powerful management message.

The first, "Technical Credentials Not His Long Suit," extolled a management style that is heavy on a communicative attitude toward top management and light on technology. The third, "DP Managers Need More Than Managerial Skill," took an opposite tack, with emphasis on thorough knowledge of DP technology and operations.

Sandwiched in between, on an apparently predestined page number (13!) were three very unlucky, desperate situations in Larry Long's new "Dear Abby" column. That each is in the final throes of terminal illness is clear from the advice given.

Where is management? None is effectively in view. Either style — communicative or technically intense — or a hybrid of the two would work improvement in each case.

Certainly the "handwriting is on the wall." The original Biblical handwriting's advantage was its divine engravement, unmistakably visible to "management" — the king. Perhaps the messages have been written with invisible ink in the hopeless situations above. Management in each case could learn a practical Old Testament lesson from the Book of Daniel, Chapter 5. Too late did the king learn of the sheer folly in ignoring the obvious.

Peter Kushkowski
Haddam, Conn.

Compiler Designers' Note

I would like to ask an open question of the Cobol-compiler designers among *Computerworld's* readers: Has anyone ever implemented "index-names" internally as *two* registers, one containing the "occurrence number" and the other the storage-displacement equivalent?

The classic face-off between subscripts and indexes — that subscripts are quickly changed or tested but slowly used, whereas indexes are quickly used but slowly changed or tested — seems an unnecessarily forced decision.

A dual implementation would add one extra instruction to any SET operation and in exchange would drastically simplify and speed up the code generated for:

```
PERFORM . . . VARYING index-name . . . UN-
TIL index-name = numeric-data-item
```

or any other comparison of an index-name against a numeric "occurrence-number" value, since the internal storage-displacement value would not have to be deconverted.

We have learned that it is a good DP tactic to defer a system "decision" as much as possible:

- Don't hard-code it, COPY it from a library.
- Don't COPY it, link-edit it.
- Don't link-edit it, dynamically attach it at load-time.
- Don't attach it at load-time, read it from a table file at run-time.

I suggest that the same tactic of avoiding premature decisions applies to the choice of internal representation for an index-name. To make that choice finally and universally at the compiler-design stage seems wildly premature: it should be deferred at least until the program-compile stage and avoided altogether (by using dual representation) for those index-names which appear in "PERFORM . . . VARYING index-name" or comparable constructs.

The present unnecessary face-off compromises the value of index-names, which otherwise are useful encouragers of locality, because any knowledgeable programmer feels a twinge of discomfort when writing "IF index-name = numeric-data-item." Cancel that twinge!

Robert Higgins
W. Chester, Pa.

Computerworld welcomes comments from its readers. Letters should be addressed to Editor, *Computerworld*, 375 Cochituate Road, Rt. 30, Framingham, Mass. 01701.

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Significant Blanks Set for Fortran

By Marcy Rosenberg
CW Staff

SAN FRANCISCO — Fortran programmers won a little and lost a little when the American National Standards Institute's (Ansi) Fortran standardization committee, X3J3, voted 19-6 to make blanks significant in its next revision of the language.

Coming at the last committee meeting held here earlier this month, the watershed decision will make standard syntactic rules requiring that blanks be placed in specific positions in Fortran statements, according to Guy de Balbine, an alternate X3J3 committee member and independent software design consultant.

What users are expected to gain when the standard goes into effect are more reliable statements, simpler syntax and code that will be more streamlined, English-like, uniform and therefore easier to read, de Balbine said.

The trade-offs? He admitted that coding will be less flexible and incompatibilities may result if old- and new-style statements are mixed during the transition period.

Fundamental Rule Obsoleted

The decision to introduce significant blanks in Fortran marks "the first time the standards committee has obsoleted an existing fundamental rule of the language," a rule that requires programmers to parse Fortran statements without relying on blanks, de Balbine stated.

Because blanks under the current rule carry no syntactic significance, he noted they can for the most part be sprinkled arbitrarily anywhere in Fortran statements — for example, within constants in an ASSIGN statement — or omitted entirely and not render the statement illegal. While this flexibility gives programmers added freedom in writing code, failure to use blanks in some cases can result in ambiguous or unreliable statements, de Balbine observed.

He cited an example with DO-LOOP statements. One such statement written without blanks is: DO10I=1,5. This statement "tells" the compiler to execute routine 10 five times, setting I equal to 1 the first time, I equal to 2 the second time and so on.

The same statement, if intended as a DO-LOOP but accidentally written with a period instead of a comma — DO10I=1.5 — would still execute, but be understood by the compiler to be an ASSIGN statement to set the variable DO10I equal to 1.5.

Making blanks syntactically significant may help eliminate this kind of situation, depending on what conditions for placement of blanks the committee ultimately defines, de Balbine remarked. A rule requiring a blank to follow the DO command in a DO-LOOP statement, for example, would render "DO 10I=1.5" il-

(Continued on Page 44)

Software: How Do You Find The Best Fit?

Generally, the more options we have, the more comfortable we feel — but the tougher it is to make the best choice.

Just such a challenge confronts user organizations in the market for systems and utility software as they try to sift through an ever-expanding number of available products for the one "best-fit" to their needs.

Making the right selection hinges on many considerations:

- How to evaluate the various types of systems and utility packages.
- How to choose a supplier.
- When to stick with software supplied by the hardware vendor — and when to turn to independent software developers.
- How to negotiate contracts.
- How to ensure the best maintenance for a multivendor installation.
- How to benchmark.

A June 30 *Computerworld* Special Report on systems and utility software will explore these issues. Contributed articles are welcome.

Please send tutorial essays, accounts of user experiences, reviews of current products and speculations about future trends — along with any related charts or graphs — to Marcy Rosenberg at CW, 375 Cochituate Road, Rte. 30, Framingham, Mass. 01701, no later than April 30. Texts should run no longer than six typed, double-spaced pages.

Pansophic Enhances 'Panvalet' By Adding TSO/SPF Option

OAK BROOK, Ill. — A Structured Programming Facility (SPF) option for Panvalet, a control and management system for source libraries, has been released by Pansophic Systems, Inc.

Because the SPF option interfaces directly to Panvalet libraries, the vendor claimed Time Sharing Option (TSO) work data sets are not needed. In addition, the EDIT function of the SPF Option retrieves a Panvalet member directly to main memory, where it can be modified.

All browse facilities for member review are also supported, Pansophic said.

The SPF option also allows direct access to the Panvalet directory from IBM's SPF facility. With this feature, users can generate a qualified member list. Members can be selected based on specified Panvalet characteristics, the vendor said.

Designed as an extension to the IBM facility, Pansophic's SPF option follows SPF conventions, but runs only in an OS environment.

A series of menus geared for Panvalet provides access to the Panvalet library and reportedly requires fewer keystrokes for access. Identical program function key support is also provided.

The SPF Option costs $6,000. Panvalet costs $5,980 for OS users and requires a minimum of 40K bytes of memory, Pansophic said from 709 Enterprise Drive, Oak Brook, Ill. 60521.

Copy Facility Updates 'Syncsort'

ENGLEWOOD CLIFFS, N.J. — A copy facility that Whitlow Computer Systems, Inc. claimed will reduce resource consumption on straight-copy tasks was added to its Syncsort OS sort/merge utility.

Known as Bettergener, the enhancement is Whitlow's alternative to IBM's Iebgener for straight-copy tasks and runs on all IBM 360, 370 or equivalent processors.

Bettergener is said to automatically intercept all Iebgener requests without requiring control statements, JCL or exit coding to be changed. Tasks that do not involve straight copying are returned to Iebgener for processing, Whitlow explained.

The vendor claimed Bettergener has reduced elapsed time by 20% to 60%, problem-state CPU time by 30% to 60% and supervisor-state CPU time by 50% to 70% in tests/comparing it to Iebgener.

The copy facility is included free in Release 2.3 of Syncsort OS. Syncsort OS is available on a three-year license for $6,200 or a one-year license for $3,000 from Whitlow at 560 Sylvan Ave., Englewood Cliffs, N.J. 07632.

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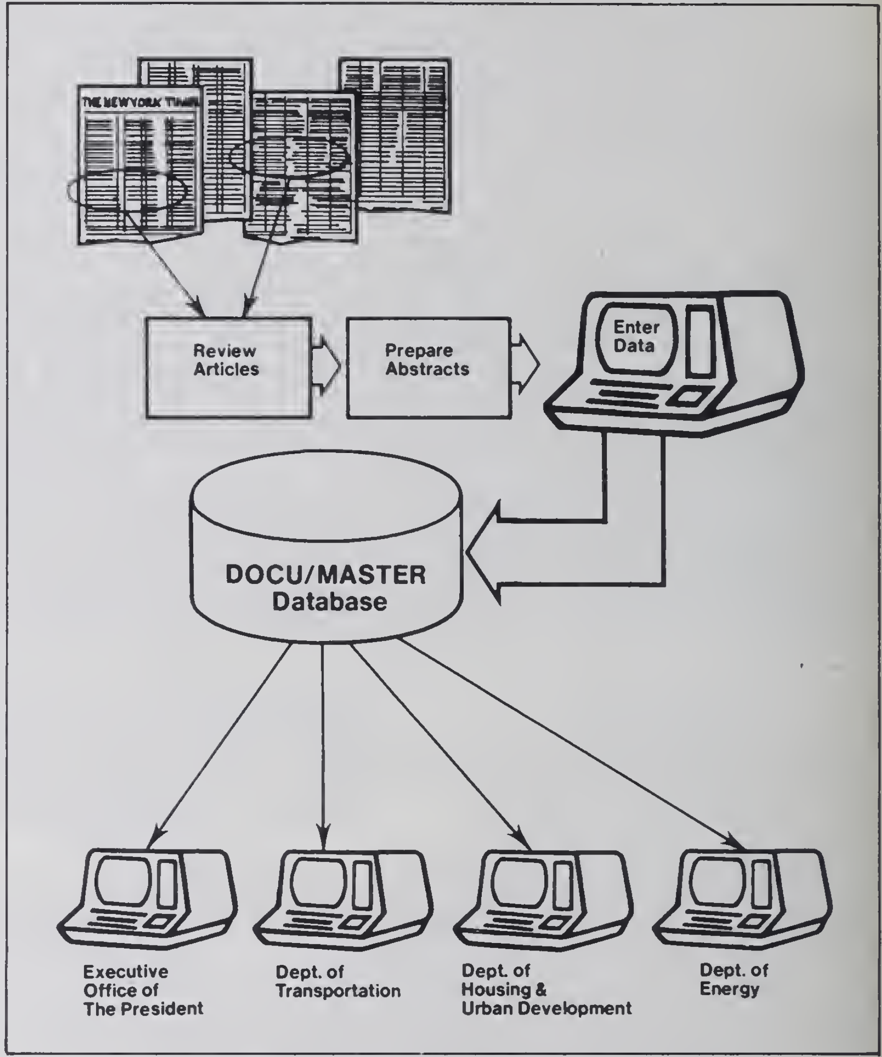
Monitors Issues for White House

Information Bank Keeps Up With the Times



Issues Monitoring System Used by the White House

NEW YORK — With a six-year-old information retrieval system falling behind the times technologically, the New York Times Information Bank recently decided to look for software to upgrade its text storage and retrieval capabilities.

Though generally pleased with the exsisting system, Information Bank officials recognized that it was hard to use.

Running on an IBM 370/148 processor, the system used a predefined vocabulary. Although it stored news clippings and abstracts on subjects mentioned in the stories, a user was required to know the proper format for retrieving the information. That wasn't good enough, Joseph Flynn, vice-president of DP, maintained.

The *Times* wanted to build a system that would regard every meaningful word of a news story as a separate field. In this way, a user could simply enter a subject and the system could either prepare an abstract of all the things written about that subject, put that information in a report or reproduce the text of the original story. Flynn also wanted the system to be capable of producing a combination report plus a text of selected news stories.

To meet its requirements, the firm decided on Docu/Master, a text storage and retrieval system from Turnkey Systems, Inc. (TSI), to complement its existing TSI customized teleprocessing monitor and data base management system (DBMS).

Ease of loading, advanced indexing techniques and storage efficiency were high on the list of requirements, Flynn said.

Issues Monitoring System

However, the real reason for choosing Docu/Master was that the Information Bank had an opportunity to provide an Issues Monitoring System to the White House based on the *Times'* current system.

The problem was, the President needed the service in a hurry — about two months. The Information Bank wanted the White House contract and decided to stick with TSI, because Flynn said he was satisfied with its products.

The contract was signed in October 1978 and the system was implemented before the end of the year, Flynn said. Moreover, the Information Bank used the Issues Monitoring System as a "launching site" for updating its own system.

Data Base

The Issues Monitoring System data base is geared for use by Executive Office of the President (EOP) staff members who need information about a wide variety of current topics. To create the base, Information Bank researchers review and abstract major news articles from *The New York Times* and about 60 other publications every day.

The end product is an information source that includes data on approximately 500 major world issues, people and organizations at any given moment. The data base is supplemented by a directory of specific terminology which may be used to assist in constructing a search.

The Issues Monitoring System is available to all offices under the EOP including the Domestic Policy staff, Office of Management and Budget (OMB), the Council on Wage and Price Stability and the White House office staff. It is also used by the Departments of Transportation, Housing and Urban Development and Energy.

Users may access the system directly through terminals in their own offices or refer requests to the White House Information Center. Requests range from simple fact verifications to extensive research projects that may take three to 24 hours to complete, Flynn said.

Search Operation

A search operation consists of a few easily learned commands. An actual search, for example, requires typing the desired words, phrases, dates or date ranges. The system responds with the number of references found.

For DP services, Docu/Master offers the Information Bank some important features, Flynn said. For example, the "index" relates all the words to their associated documents.

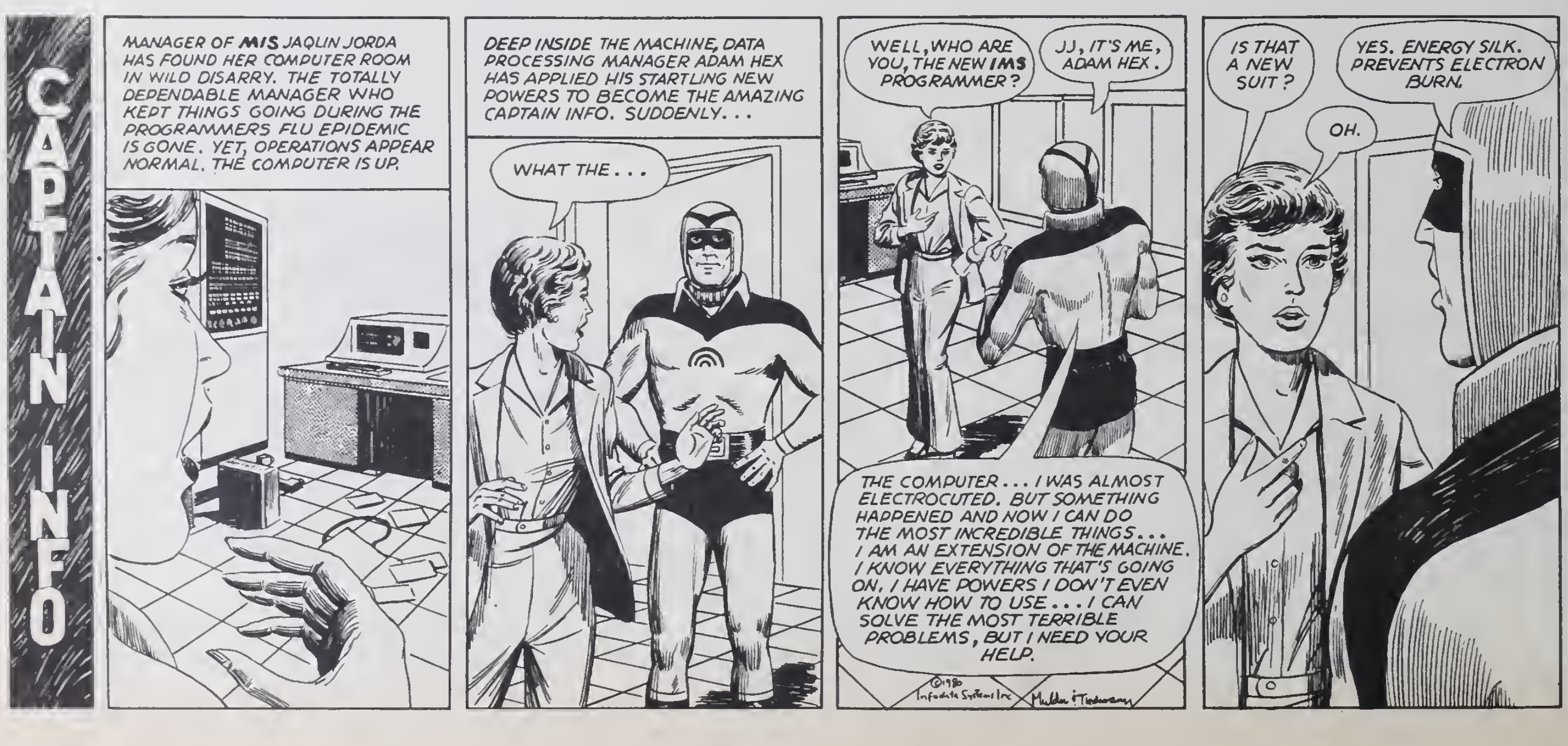
Each time the data is revised, the index file is also updated to reflect each change. "The dynamic reorganization of the index and the entire update procedure," Flynn said, "is very clean and flexible compared to the requirements of other systems."

A second index benefit is the minimum amount of storage space required. As more documents are added to Docu/Master, the size of the index file levels off.

Docu/Master also provides a "tier structure" of search and retrieval options. At one level, it is a tool to provide a manager or executive with the facility to simply talk to a large information base and get answers to specific questions.

At a higher level, in an information science environment, it is a research vehicle for technicians or professional researchers. At this level, full Boolean logic and proximity relationships based on distance or order may be used to perform more complex searches, Flynn said.

"People can use it in a variety of ways. It can be a stand-alone product, the central element of a larger system or a building block to complement other products," according to Flynn.


CAPTAIN INFO
MANAGER OF MIS JAQLIN JORDA HAS FOUND HER COMPUTER ROOM IN WILD DISARRY. THE TOTALLY DEPENDABLE MANAGER WHO KEPT THINGS GOING DURING THE PROGRAMMERS FLU EPIDEMIC IS GONE. YET, OPERATIONS APPEAR NORMAL. THE COMPUTER IS UP.
DEEP INSIDE THE MACHINE, DATA PROCESSING MANAGER ADAM HEX HAS APPLIED HIS STARTLING NEW POWERS TO BECOME THE AMAZING CAPTAIN INFO. SUDDENLY...
WHAT THE...
WELL, WHO ARE YOU, THE NEW IMS PROGRAMMER?
JJ, IT'S ME, ADAM HEX.
THE COMPUTER... I WAS ALMOST ELECTROCUTED. BUT SOMETHING HAPPENED AND NOW I CAN DO THE MOST INCREDIBLE THINGS... I AM AN EXTENSION OF THE MACHINE. I KNOW EVERYTHING THAT'S GOING ON. I HAVE POWERS I DON'T EVEN KNOW HOW TO USE... I CAN SOLVE THE MOST TERRIBLE PROBLEMS, BUT I NEED YOUR HELP.
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Transaction Processor Fits Series/1 Under RPS

NEW YORK — The Reiter Transaction Processor (RTP), designed for the IBM Series/1 system, runs under the Real-Time Programming System (RPS) operating system and supports up to 16 terminals.

Based on IBM's Multiple Terminal Manager (MTM), RTP resides in a separate memory partition and reportedly does not take up additional memory from the address space of the application, according to its vendor, Data Structures, Inc. (DSI).

Communications between RTP and the applications programs is through the shared task set. Because RTP run-time programs are mostly resident in main memory, response time to terminals is improved, DSI claimed.

RTP supports Cobol, PL/I, Fortran and assembler languages and provides utilities for interactive screen formatting and automatic data handling.

To construct a screen, a programmer calls a screen definition utility to work directly at a terminal. Similarly, a data record can be formatted or program flow directed to relate to the previously defined screens, DSI noted.

A "screen write" is the only command used internally by the application program. The remaining functions are processed by utility-defined commands.

Input Validated

RTP automatically validates data input from the operator based on stored record definitions, the vendor explained. Built-in checks include type validation, check digit range checks, index/table and "mandatory fill."

Application program segments are loaded and executed only after operator input is validated.

Hierarchical menu selection is function-key-driven, as are certain system functions such as "help" or "interrupt" requests. Function keys can be built into the hardware of the terminal being used, typed in by the operator or a combination.

An RTP license fee of $7,000 includes training, documentation and maintenance, DSI said from 122 E. 42 St., New York , N.Y. 10017

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Features SMF Routines

'EDP-Auditor' Enhanced

WELLESLEY, Mass. — Cullinane Corp has released an enhanced version of its library of generalized audit and retrieval routines that features a series of routines for IBM's Systems Management Facilities (SMF).

EDP-Auditor Version 5.5 is a library of 110 modules condensed to 64 generalized audit and retrieval routines that reportedly enables internal auditors to perform their activities independently. The package also meets Foreign Corrupt Practices Act requirements, Cullinane said.

The enhancement includes 10 commonly used SMF routines: frequency distribution of record types on file; abend listings; renamed data set; scratched data sets; data set access listing; SMF record management listing; CPU usage listing; extract routine; hex dump routine; and time/condition code conversion routine, according to Cullinane.

The SMF routines define all record types in the SMF file and allow users to employ any record type with a single macro instruction, the vendor added.

Also included in the enhancement is an English-like free-form language. Previous releases of EDP-Auditor have a fixed-form English-like language.

The free-form language accepts up to 32 character names, compound arithmetic operations, global selection logic, statistical sampling, distribution analysis and graph and confirmation capabilities, the vendor said.

EDP-Auditor 5.5 runs on any IBM operating system used on 360, 370, 30 series and 4300 and compatible mainframes, the vendor said.

The package costs $17,000 for a one-time license plus $2,000/year for support, which includes maintenance, enhancements and a 24-hour hot line, Cullinane said from Suite 105, 148 Linden St., Wellesley, Mass. 02181.

'OWL' Updated

ATLANTA — Support for Pansophic Systems, Inc.'s Panvalet program management system, the CICS Test Program Loader and the IBM Library Access Interface are among options added to Version 5.0.2. of the OWL on-line programming package from National Computing Industries, Inc. (NCI).

A GET FROM Panvalet command will give users of that library the capability to cópy a Panvalet data set into an on-line data base scratch pad for display or modification, NCI said.

Loader allows CICS users to replace a production program with a test version without needing to perform a rename procedure, the vendor noted.

The IBM Library Access Interface reportedly allows users to review the contents and directories of system libraries.

Other OWL enhancements include an optional sign-on procedure; an expanded EDIT SEARCH subcommand; a DUP function key; an EDIT subcommand menu; and individual EDIT subcommand help screens, the vendor said.

The GET and VIEW commands have been expanded to include all spooler queue jobs.

The Panvalet Library Option costs $500, the CICS Test Program Loader costs $350 and the IBM Library Access Interface costs $750. OWL costs $3,500 to $13,800, depending on the modules used. The package requires a minimum of 32K bytes of memory.

Version 5.0.2. is free to current OWL users, NCI noted from 3720 Longview Drive, Atlanta, Ga. 30341.

'RBS1' Aids JCL For DOS Users

FOUNTAIN VALLEY, Calif. — A utility that reportedly aids job throughput for installations using DOS/VS, DOS/VSE or DOS is available from RBS, Inc.

RBS1 eliminates the card handling normally associated with conventional DOS-oriented JCL setup, use and modification, its vendor claimed.

Under RBS1, a series of program steps can be stored under a single identifier, a facility that allows the operator to later trigger execution of a complete jobstream with a single command. An RBS spokesman noted programs can be executed in any sequence or combination.

The utility is said to also enable an operator to add to the stored JCL procedures. Control cards for special work — one-shot extractions from a file or year-end reports, for example — can be entered through the console. Password security is provided to protect user files.

RBS1 costs $4,000 from RBS, 10412 Egret Ave., Fountain Valley, Calif. 92708.

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They're Not Mutually Exclusive

Copyrights, Trade Secret Clauses: Use Both

By Charles A. Triay
Special to CW

The Supreme Court has ruled that computer programs are not patentable, so a software developer must rely upon copyright and trade secret law for product protections.

In "CPA Challenges Trade Secrets Decision" [CW, Feb. 11], an attorney suggested that copyright and trade secret protections are mutually exclusive and that a software developer cannot rely upon both protections for his products. This is a common misconception. A developer can enjoy both protections if he is careful.

Federal copyright law protects against the unauthorized copying of the physical form of a work, but does not protect the ideas expressed within the work. State trade secret law guards against the misappropriation of confidential ideas, know-how, processes and techniques.

The two bodies of law protect two different property rights, and the laws are not mutually exclusive in theory. However, it is commonly believed that when a work is copyrighted, its contents become public knowledge and lose their trade secret status.

It is true that when a copyright is registered, copies of the work must be deposited with the Library of Congress and the work's contents thus become available to the public. However, it is a little-known fact that a work can receive copyright protection without being registered.

The developer can prohibit unauthorized copying by simply placing the proper copyright notice on his computer program. When an infringement takes place, the developer can register his copyright at that time and commence suit.

By delaying the registration of his copyright, the developer loses the right to sue for statutory damages and attorney fees, but he is still able to sue for his actual damages, recovery of the infringer's profits and destruction of all infringing copies.

Therefore, by placing a copyright notice on his computer program but delaying the registration of the copyright, the developer will secure effective copyright protection without jeopardizing the confidential trade secret status of the program's contents.

Licensing Protection

Similarly, a computer program can be licensed to customers without losing the trade secret status of the program's contents. The developer can include a trade secret confidentiality agreement in his software licenses which specifies that the customer will take reasonable steps to ensure that the contents of the program are not disclosed to third parties.

Therefore, copyright and trade secret protections are not mutually exclusive in theory and need not be mutually exclusive in practice. The software developer who wants to have both protections should include a confidentiality agreement in his software licenses and include both copyright and trade secret notices in all of his programs, listings and documentation.

If a program is later infringed upon, the vendor can choose between suing on trade secret misappropriation or registering his copyright and suing for copyright infringement.

Triay is an attorney in private practice in Oakland, Calif., specializing in computer law.

'Formit' Backs Level 6 Cobol

MIAMI — A software system for generating Cobol code directly from screen displays on Honeywell, Inc. Level 6 computers is available from American Computer Center, Inc.

The system, known as Formit, operates on the Level 6 MOD200 and MOD400 operating systems.

Once a screen display is created, execution of the Formit program will generate the Cobol code necessary to drive the form, a vendor spokesman claimed.

Formit execution time runs from 3 min to 5 min depending on the size of the screen, he added.

A minimum 64K-byte Level 6 configuration is recommended to run Formit, which leases for $2,500 from American Computer Center, Inc. 8510 N.W. 56 St., Miami, Fla. 33166.

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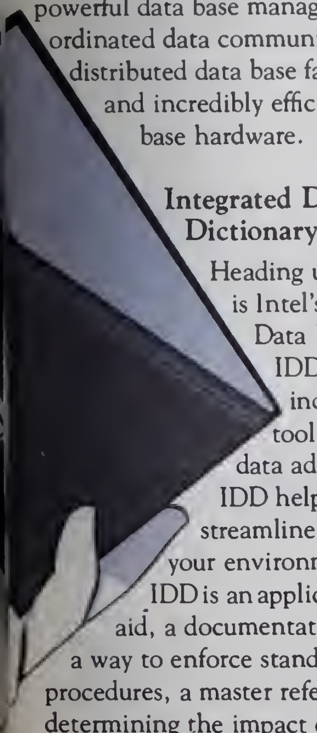

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Package Backs Publishers

CHERRY HILL, N.J. — Service Software, Inc. has developed the Computerized Fulfillment System (CFS) as an alternative to service bureaus for publishers' subscription fulfillment activities.

Designed to run on the IBM Series/1, CFS reportedly provides users with an on-line, interactive, real-time system that can be operated by a publisher's in-house personnel.

Customer and order information can be accessed by new account number, match code or part of a match code, current account number, invoice number, order number or check number.

Order entry for new subscribers is accomplished by supplying the subscriber's name and address. The CES address meets all domestic and foreign mailing conventions, the vendor said; telephone number and five demographic fields can also be entered with the new address.

CFS is written in ANS Cobol, runs on a minimum of 96K bytes of memory and can handle 1,000 to 250,000 subscribers. Depending on the complexity of the software, its price ranges from $17,000 to $30,000.

Service Software is at Suite 224, 498 N. Kings Highway, Cherry Hill, N.J. 08034.

Next Revision of Fortran To Set Significant Blanks

(Continued from Page 39)

legal as either a DO-LOOP or as an ASSIGN statement, allowing the compiler to catch the error.

Besides making coding more reliable, significant blanks will likely streamline syntax. Current syntactical rules, for example, mandate that a Structured IF statement, predicated on variable A being greater than variable B, be written as follows:

```
IF(A.GT.B)THEN . . .
```

If significant blanks are applied to this kind of statement, they would serve to separate text units — IF A GT B THEN . . . — and eliminate the need for parentheses and periods in this context and probably in other cases as well, de Balbine commented.

'Obsolete Features Module'

Despite these expected payoffs, de Balbine acknowledged that "change is always a difficult thing" and noted that the X3J3 committee plans to adopt a new mechanism for shedding obsolete features of the language gradually.

This mechanism will take the form of an "obsolete features module" to be written as a section in the new Fortran standard. The module will serve to introduce changes to the standard before they actually render an existing rule nonstandard.

The upcoming Fortran standards revision, then, will outline rules for using significant blanks and also indicate that current use of blanks is still permitted but will probably become obsolete by the time the next revision surfaces.

In this way, users gain time to prepare for the change and to implement the new rule gradually. In addition, existing source code will not be invalidated abruptly, according to de Balbine.

One danger, however, is that during this transtition period programmers may be forced to juggle old and new rules simultaneously, a situation that can cause incompatibilities in programs.

De Balbine is confident, though, that "between now and the time the new standards come out, there will be software utilities on the market to automatically convert source programs from the old to the new form." And, as a result, "programmers won't have to sit for hours in front of a CRT to do the editing."

Next Task

The committee's next task is to decide which commands will require blanks to follow them. De Balbine indicated the rule will probably apply to key words such as CALL, DO and IF, but stressed such details have not been finalized.

Speaking for X3J3, de Balbine stated the committee "believes that any short-term inconveniences for users will be more than offset in the long term by the comforts of a Fortran language which is more reliable and easier to use," especially as new application-oriented languages — such as for graphics — are designed with Fortran as the core language.

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Smart vs. Dumb Weighed

Report Finds Nets a Terminal Question

By Brad Schultz
CW Staff

There was a time when terminals were unobtrusive appliances, dwarfed in stature around the computer room by the central mainframe and maybe even the air conditioner on a hot day.

But no more! "Terminals are among the most important elements of any data processing system," according to Auerbach Publishers, Inc.'s Gerald W. Williams (see article on SR/2).

The Special Report on data communications terminals in this issue explores why this is so by weighing the benefits of dumb vs. smart/intelligent units.

Analysis

When is it smart to buy dumb? Jack Gostl of Conversational Systems Corp. gives guidance on this matter in an article on SR/4.

Lacking programmable memory, dumb terminals are fine for horse breeding, technical writing and tracking insurance sales if the experiences described on SR/9, SR/11 and SR/41 are representative.

Even if those aren't exactly your typical applications, Roger Evans of Micom Systems Corp. presents an argument on SR/30 that may convince you to buy less capabilities for less money during the next upgrade cycle.

On the other hand, you may want to be the first user on your block with terminals that are veritable minicomputers or, in the case of Panasonic Co.'s BC-5000 prototype [see article below], resemble something beamed down with Capt. Kirk of the starship *Enterprise.*

In fact, the most sophisticated intelligent terminals really are small business systems, Bill Shipman, a Datamedia Corp. vice-president, said in a recent interview. Other people who watch or participate in terminal making also find it hard these days to distinguish between 64K-byte terminals that run multitasking control software and communicating desktop com-

(Continued on Page 46)

Extended Net Services Described

By Phil Hirsch
CW Washington Bureau

MIAMI BEACH, Fla. — Extended network services (ENS) have become a feasible way of reducing costs and improving efficiency for many data communications users who now rely entirely on public data networks, according to two speakers who addressed an Interface '80 technical session here recently.

Dr. Lawrence G. Roberts, president of GTE Telenet Communications Corp., and J. Robert Harcharik, president of Tymnet, Inc., described how their public packet-switched networks, by supplementing a private network user's existing facilities, can answer the need for special terminal interfaces and provide an economical means of communicating with low-traffic locations — domestic and/or international.

It is much cheaper to pay for transmission by the bit to such locations, Roberts pointed out, than to lease a dedicated circuit by the month.

He added that most networks supplied by mainframe manufacturers are capable of interfacing only with terminals of the same make. Thus, by employing ENS, a user can exploit the cost and other benefits of terminals made by others.

Combining public and private transmission facilities produces a number of advantages not offered by either type of network facility alone, Roberts said. These include early service availability, wide geographic coverage, low capital investment, low risk, high reliability, easy expandability and access to special protocols. In addition, the user can retain operational control over those communication links where it is needed.

Both Telenet and Tymnet support a wide variety of terminal protocols, the speakers pointed

(Continued on Page 46)

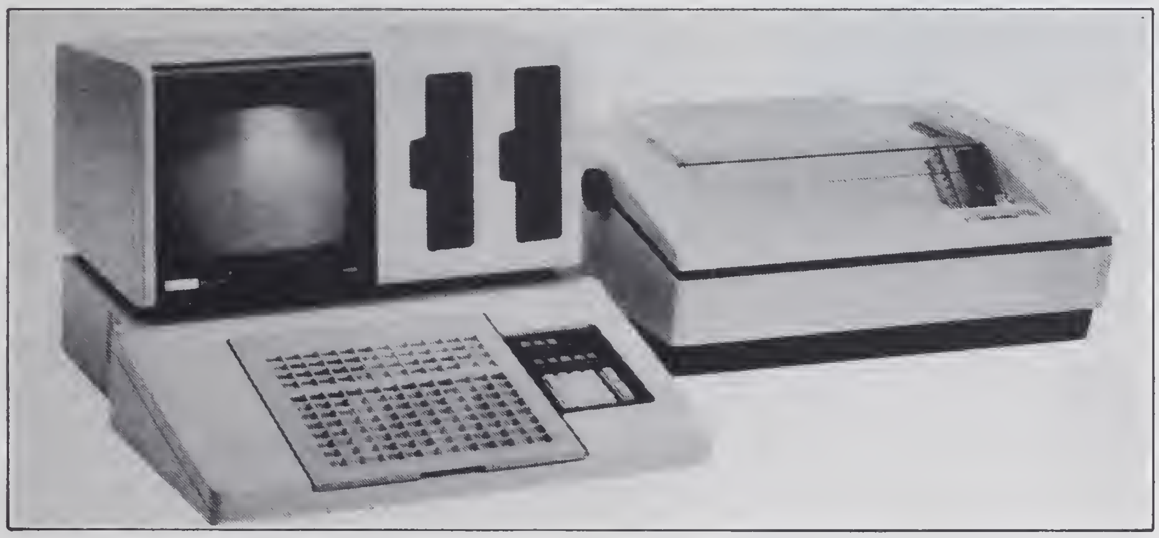
Terminal Keyboard a Quick-Change Artist

By Jay Woodruff
CW Staff

SECAUCUS, N.J. — A few keystrokes literally change the keyboard of an intelligent CRT terminal that Panasonic Co. expects to market soon.

The operator of Panasonic's BC-5000 can initiate 24 pages of keyboard arrangements by inserting a single cartridge in the unit's lift-up keyboard. By depressing a few of the terminal's upper range of

(Continued on Page 46)



The BC-5000 prototype reportedly raises terminal programmability to new heights. Entire pages of commands can be initiated by a few strokes of the terminal's keyboard. Panasonic has a compiler called "Must" to go with the 48K-byte intelligent unit.

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CW Report Weighs Intelligence vs. Dumbness

(Continued from Page 45)

puter systems from companies usually not identified with the terminal arena.

But some desktop makers are dead serious about offering their systems as intelligent terminals (see article on SR/23). At least one bank takes them seriously (see SR/45), and some vendors like Panasonic now introduce products as both systems and terminals intended to run in decentralized data communications networks.

Curious Evolution

How did we get to this situation of tails wagging dogs? The director of the European Informatics Network and three staff scientists from the UK's National Physical Laboratory trace this curious evolution in an article that starts on SR/7.

According to them, the concept of a standard communications interface was crucial to the development of terminal controllers — dedicated processors that bring order to multitudes of terminals within a network.

"The interactive terminal is possibly the most important part of any computer network or computer system," those authors maintain on SR/8. Such terminals shape the way users view their network.

The Special Report's contributors disagree on how users should approach terminal buying. Those who like checklists may enjoy the article by Microdata Corp.'s Bud Bleininger on SR/17.

However, on SR/2 Roger Pincus of Human Designed Systems, Inc. calls the checklist approach to terminal selection "the single most disastrous mistake made by many terminal purchasers." Checklists oversimplify, he explains.

At any rate, on SR/2 Digital Equipment Corp.'s Robert E. Montemerlo suggests there will be something for almost everyone in the terminal product lines launched during the 1980s. The DEC manager looks for what he calls "fixed function" terminals that "apply limited levels of intelligence, storage and functionality to particular kinds of work."

Terminal Costs

Terminal costs should remain constant during the next 10 years, Recognition Equipment, Inc.'s David L. Pease said in an interview presented on SR/32. But Pease wonders whether vendors will "force" the user to buy new terminals by eliminating the upward compatibility of their older gear.

Few users can rely on another subsidiary of their own company to help design and to supply a nationwide terminal-based data network. Still, the Expedite network established by General Electric Supply Co., with assistance from General Electric Information Services Co., is an interesting example of how intelligent terminals can expedite warehouse operations and therefore enhance support for heavy sales volumes (see SR/31).

The main benefit of intelligent terminals is supposed to be, after all, enhanced productivity. Since a company's overhead can drop substantially if ways are found to increase the output of individual workers, intelligent terminals may be worth their added expense in many user organizations over the long run (see SR/42).

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ENS Alternative Described

(Continued from Page 45)

out, so their networks can interface easily with virtually any private system.

Tymnet, for example, besides supporting its own proprietary protocol, interfaces with asynchronous terminals, IBM 2780 and other remote job entry devices; with IBM 370s; and with Datapac, Bell Canada's packet-switched network. It also connects with several overseas data networks.

Next year, Telenet will begin overlaying a satellite communications network on its existing terrestrial facilities, Roberts reported. The backbone will consist of 56K bit/sec channels interfacing at each earth station with 1.5M bit/sec T1 coaxial cables extending to local central offices in the surrounding area.

The final links — connecting the user with the central office — will consist of dial-up or leased circuits obtained from the telephone company, or packetized microwave channels terminating in small-diameter rooftop antennae.

Roberts said that by using time division multiple-access multiplexing on the uplinks, and broadcast distribution on the downlinks, the amount of message traffic carried on each satellite link will be greater than 90% of its rated capacity.

Keyboard Gives Instant Changes

(Continued from Page 45)

48 keys, the terminal will actually pull one of the pages out of the cartridge and feed it into the keyboard.

Each page contains the legends for 96 typewriter-style keys and 48 user-programmable function keys and status indicators. Each page in the cartridge can reportedly be accessed in one second, according to a spokesman.

Changing from one page to any other takes one second according to Panasonic. Once selected, the operator can press a single key on this changeable keyboard to cause it to carry out a function or multistep functions which have been programmed onto a pair of double-sided, double-density floppy disk drives, each with 1.2M bytes of file memory storage.

"For example," a spokesman explained, "depressing a single key corresponding to a specific product may display the product description, part number, unit price and extend the price unit to display total price" when more than one item is involved.

Two input/output ports are used for data communications. Transmission speeds range from 110 bit/sec to 9,600 bit/sec in either synchronous or asynchronous modes.

For programming, an assembler language and a Panasonic compiler language called "Must" are available.

An additional pair of floppy disk drives increases the BC-5000's storage capacity to 4.8M bytes.

Cost will be anywhere between $15,000 and $18,000, a Panasonic spokesman said from One Panasonic Way, Secaucus, N.J. 07094.

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Hundreds of Lines Monitored Simultaneously

MCLEAN, Va. — A monitor capable of measuring hundreds of communications lines simultaneously — thereby allowing a user to monitor an entire network on a continuous basis — is available from Tesdata Systems Corp.

The RM200 monitor immediately detects network or line failures as well as response time problems on individual lines and devices, Tesdata claimed. A version costing $48,000 will measure 32 bisynchronous lines, while access to additional groups of 32 lines can be purchased for $28,800 each.

In this way, up to 256 lines may be handled by each RM200, the vendor explained.

Tesdata also unveiled a "color network reporter" as an option to its MS109 data communications resource management system. With the reporter, users will get news of any network outage or degradation displayed on a CRT screen with a blinking color for each problem type.

The reporter costs $15,000. Tesdata is at 7921 Jones Branch Drive, McLean, Va. 22101.

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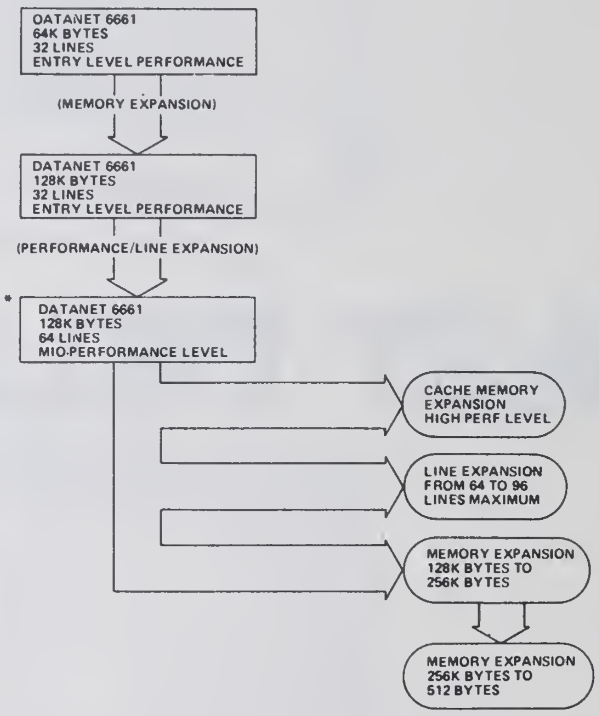
Honeywell Unveils Net Front End

WALTHAM, Mass. — Honeywell, Inc. has announced a Level 6-based front-end processor for users of large-scale Honeywell systems that will replace and span the performance ranges of its two high-volume network processors.

The Datanet 6661 was designed for use with the DPS 8 family of large systems as well as the Level 66/DPS and Level 68/DPS systems groups (see figure). It is reportedly an enhanced version of the Datanet 6641 and 6651, now incorporating 16K MOS technology and bulkhead connectors designed to ease installation and configuration of data cables, according to Honeywell.


DATANET 6661
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DATANET 6661
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32 LINES
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(PERFORMANCE/LINE EXPANSION)
*
DATANET 6661
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64 LINES
MID-PERFORMANCE LEVEL
CACHE MEMORY EXPANSION HIGH PERF LEVEL
LINE EXPANSION FROM 64 TO 96 LINES MAXIMUM
MEMORY EXPANSION 128K BYTES TO 256K BYTES
MEMORY EXPANSION 256K BYTES TO 512 BYTES

* ADDITIONAL PERFORMANCE, MEMORY AND LINE EXPANSION OPTIONS MAY BE ADDED IN ANY SEQUENCE AFTER REACHING THIS POINT IN THE UPGRADE PATH.

Upgrade Path for Datanet 6661 Front-End Processor

The 6661 base version has the same performance and configuration possibilities as the 6641. It includes a 64K-byte front-end processor, a communications console, direct interface adapter and host connections and up to 32 communications lines.

A fully configured 6661, which the vendor said performs as well as the 6651, can be ordered with as much as 512K bytes of memory, 96 communications lines and a cache memory for more rapid throughput.

Honeywell said the 6661 is logically compatible with the front-end network processors it replaces, supporting the firm's Remote Terminal Supervisor-II, Network Processing Supervisor and Multics Communications System.

The entry-level 6661 sells for $48,805, with maintenance costing $261/mo. Monthly rental rates on one-, three- and five-year terms are $1,772, $1,611 and $1,444, respectively, Honeywell said.

Multiplexer Costs Less Than $1,000

CHAMPAIGN, Ill. — A four-channel asynchronous digital multiplexer costs less than $1,000 from Compre Comm, Inc.

The Sprint/Mux reportedly eliminates the need for setup switches on asynchronous terminal channels. No setup is required for speed, parity or word length, a spokesman said.

The Compre Comm unit is already serving some users, the spokesman indicated. In one application, the Sprint/Mux supported four graphics terminals running at 1,200 bit/sec over a 4,800 bit/sec composite.

Synchronous Composite

The Sprint/Mux composite must be synchronous and up to 19.2K bit/sec, the spokesman noted. Terminals should be running at one-fourth of the composite speed, but can run at much lower proportions, he stated.

Another benefit was said to be virtual elimination of propagation delay, which reportedly reduces to less than one character time in typical applications.

Sprint/Mux costs $975 from Compre Comm at 51 E. Chester, Champaign, Ill. 61820.

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Multidrop Concentrator Replaces FDM

CHATSWORTH, Calif. — A multidrop concentrator that replaces a frequency division multiplexer (FDM) is available from Micom Systems Corp.

Although the FDM offers a simple, low-cost solution to those wishing to let several terminals at different locations share a telephone line, it has severe performance limitations that prevent its use with terminals at faster than 1,200 bit/sec, Micom claimed.

The vendor's Micro900 multidrop concentrator reportedly provides the same multipoint line-sharing capability as the FDM, but allows terminals to run at virtually any asynchronous data rate as fast as 9,600 bit/sec.

The Micro900 allows up to 16 asynchronous data terminals to share a single telephone line, multidropped in up to eight separate locations.

Micom indicated that the unit works best with dumb CRT and printing terminals tied to a minicomputer but lacking built-in error control and the ability to run on polled networks.

The concentrator is designed to allow such terminals to be multidropped along a single phone line and polled without special software in the same manner as the more sophisticated terminals typically furnished by the large mainframe vendors, a spokesman said.

The Micro900 costs $1,250 for a 2-channel node unit, $2,750 for an 8-channel node or master unit and $4,800 for a 16-channel master unit.

Micom is at 9551 Irondale Ave., Chatsworth, Calif. 91311.

Loop Automatic Bypass Cuts Terminal Downtime

LOUISVILLE, Ky. — A Loop Automatic Bypass (LAB) developed for IBM 3608 point-of-sale terminals and others utilizing loop technology reportedly reduced downtime in a system of remote bank terminals from 20% to less than 1%.

The terminals are part of a system in which grocery store customers may query a terminal, receive a ticket and present it to a checker for cash.

The system was developed by Stephen Ellington of Citizens Fidelity Bank & Trust Co. here. None have been sold or used outside Citizens Fidelity to date. A patent is pending on the LAB, which Ellington has put on the market for $3,200.

'Christmas Tree Lights'

The LAB was designed to supplant the "Christmas tree light" system of several remote loops operated through 2-in. simplex telephone lines. When one terminal went down, it dragged the others on the loop down with it.

To address the problem, duplex phone lines were installed from 65 participating stores to nine LABs located in various branch offices, and from the LABs to the bank's main office. That provided for two-way transmission among up to 14 terminals and the individual LABs and created a system of centrally controlled hubs.

Detectors in the LAB automatically bypass a line if the phone line goes bad, a store loses power or the modem no longer transmits. Manual bypass switches are also provided.

In addition, the LAB includes a decibel meter and signal monitor to measure amplification, or the strength of a system's signal, in compliance with Bell regulations.

Ellington can be reached at 3010 Hickory Lane, LaGrange, Ky. 40031.

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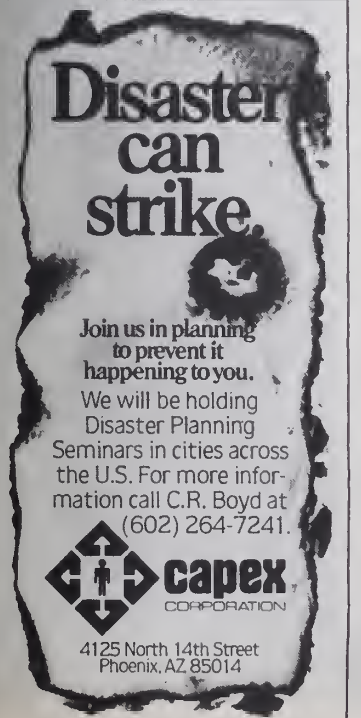

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CRT Offers Multiple Protocols

SAN JOSE, Calif. — A multiprotocol, multifunction CRT terminal that reportedly interfaces with most major mainframes is available from ECS Microsystems, Inc.

The ECS 4000 terminal offers multiprotocol options for IBM, Burroughs Corp., Honeywell, Inc., NCR Corp., Digital Equipment Corp. and other makes of computer systems, an ECS spokesman said. Featuring a 16K-byte buffer, the terminal displays 25 80-char. rows using an 8 by 7 dot matrix.

Like the Model 4500 terminal ECS released in January [CW, Jan. 21], the 4000 incorporates a Z-80 microprocessor and is intended to answer growing user demand for network equipment that can run with a broad range of different systems types, the spokesman stated.

The 64K-byte 4500 can act as a local cluster controller in networks with distributed 4000 terminal nodes.

The 4000 and 4500 can work together for local data collection, concentration and transmission — tasks crucial to such industries as banking, airline, manufacturing, newspaper and transportation, the spokesman pointed out.

The ECS 4000 can be interfaced to Centronics Data Computer Corp. printers as well as those from DEC, Nippon Electric Co., Teletype Corp. and others, and it communicates synchronously or asynchronously at speeds from 75- to 19.2K bit/sec using an RS-232C standard interface.

Editing functions of the terminal include reverse video and reverse video cursor, character repeat, blinking, underline, double-width characters for highlighting specific fields, insert/delete character and protected fields.

The price for the ECS 4000 is between $2,500 and $3,000, depending on the type of protocols involved.

ECS Microsystems is an Australian company that moved its international manufacturing and marketing headquarters to San Jose last year and began customer shipments in January.

ECS is headquartered at 215 Devcon Drive, San Jose, Calif. 95112.

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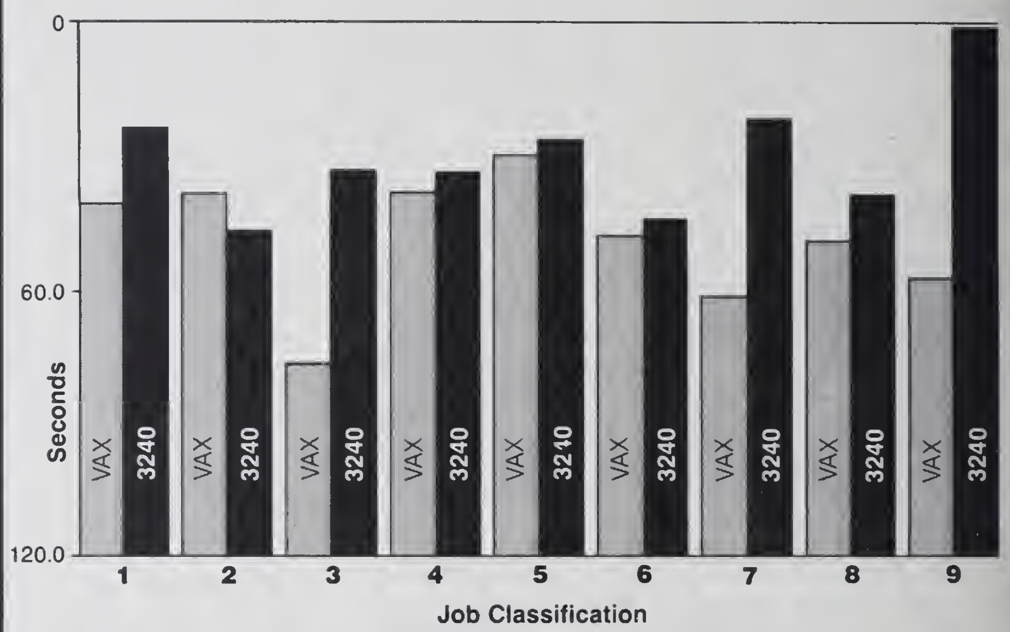
1. Performance Measurements

Benchmark Name	VAX 11/780 CPU time	Perkin-Elmer 3240 CPU time	Performance Ratio*
PMS0154	1.140	0.907	1.26
PMS0254	4.710	4.485	1.05
PMS0354	9.160	8.990	1.02
PMS0454	43.610	43.451	1.00
PMS0554	86.420	86.123	1.00
PMS0664	1.610	1.350	1.19
PMS0764	7.040	6.679	1.05
PMS0864	13.730	13.370	1.03
PMS0964	66.830	66.068	1.01
PMS1064	132.920	129.727	1.02
PMS1124	1.520	1.306	1.16
PMS1234	2.470	2.424	1.02
PMS1324	1.310	1.618	0.81
PMS1407	251.560	37.327	6.74
PMS1507	50.260	57.657	0.87
PMS1674	22.440	23.005	0.98
PMS1724	52.550	53.133	0.99
PMS1807	50.180	34.766	1.44
PMS1907	32.020	34.679	0.92
PMS2007	17.720	20.264	0.87
PMS2107	13.450	20.242	0.66
PMS2202	33.311	26.352	1.26
PMS2324	121.610	137.997	0.88
PMS2402	0.940	0.539	1.74
PMS2502	0.720	0.562	1.28
PMS2624	122.920	227.689	0.54
PMS2708	4.850	0.961	5.05
PMS2809	103.770	0.006	17295.00
PMS2934	0.660	0.414	1.59
PMS3009	0.230	0.006	38.33
PMS3103	0.610	0.398	1.53
PMS3202	4.740	3.923	1.21
PMS3307	2.470	1.959	1.26
PMS3407	39.190	7.774	5.04
PMS3507	5.580	2.587	2.16
PMS3607	156.540	20.077	7.80
PMS3701	4.480	1.621	2.76
PMS3802	4.060	2.874	1.41
PMS3903	6.050	3.864	1.57
PMS4002	9.330	5.505	1.69
PMS4102	76.290	77.764	0.98
PMS4202	118.490	125.039	0.95
PMS4301	110.650	75.569	1.46
PMS4403	1.990	0.739	2.69
PMS4584	219.990	189.081	1.16
PMS4603	18.640	16.939	1.10
PMS4701	0.350	0.077	4.55
PMS4802	0.830	0.880	0.94
PMS4934	0.340	0.050	6.80
PMS5008	0.430	0.168	2.56
PMS5108	98.950	55.419	1.79
PMS5208	0.900	0.917	0.98
PMS5308	0.330	0.029	11.38
PMS5408	2.080	1.697	1.23
PMS5502	1.130	2.180	0.52
PMS5602	207.140	198.685	1.04
PMS5703	585.170	254.545	2.30
PMS5824	18.740	18.194	1.03

$$\text{*Performance Ratio} = \frac{\text{VAX 11/780 CPU time}}{\text{Perkin-Elmer 3240 CPU time}}$$

2. Perkin-Elmer 3240 vs. VAX* Average Time by Job Classification



1. Integer
2. Single-precision
3. Double-precision
4. Math functions
5. Single-precision whetstone timings
6. Double-precision whetstone timings
7. Arrays
8. Job mix
9. Compiler technology

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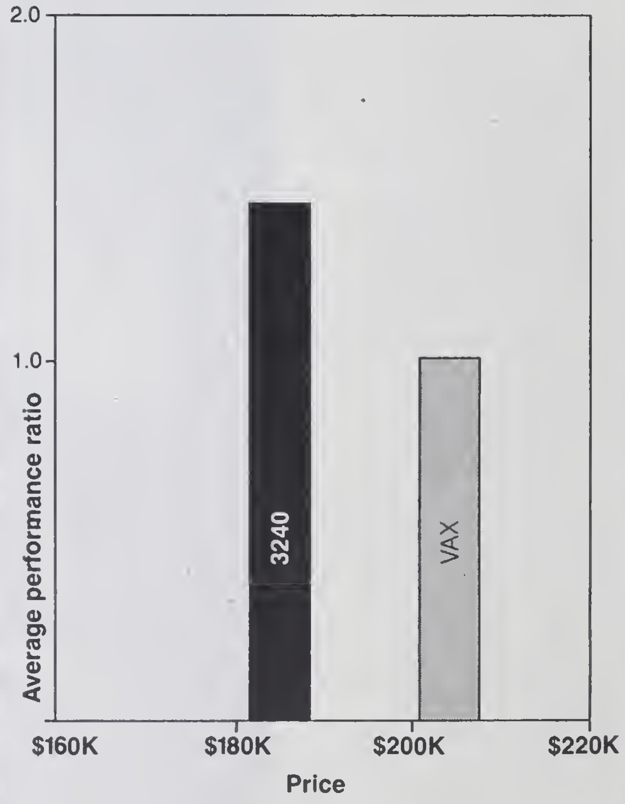

The configurations tested were 2 MB of memory, 67 MB disc, 75 ips tape, Floating Point Processor, CRT terminal, battery backup, and system software. The 3240 had a Writeable Control Store and Fortran Enhancement Package, while the VAX 11/780 had a Floating Point Accelerator.

The Perkin-Elmer 3240 is Faster than VAX.

Our 32-bit Model 3240 performed 44 out of 58 benchmark tasks faster than the more expensive VAX 11/780.

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In 44 of the benchmarks, the 3240 performed *faster* than VAX.

Overall, the 3240 delivered an average 1.4 times higher performance.

Yet the 3240 configuration costs approximately $20,000 less than its corresponding VAX configuration.

All 58 FORTRAN benchmarks listed in Table 1 were submitted by our customers and prospects reflecting their application needs. Applications that deal with the same kind of problems you face every day.

All benchmarks were run on-site at various locations across the country. And all were run by vendor-trained operators.

In Table 2, we organized the benchmark results into nine common types of job classification, so you can see at a glance how the 3240 stacks up vs. VAX 11/780. (The ninth classification demonstrates the superiority of Perkin-Elmer's system software, in this case globally optimizing FORTRAN VII.)

As shown in Table 3, the story is simple and uncomplicated. The Perkin-Elmer 3240 outperforms VAX 11/780. And it costs less.

The 3240 is faster than VAX in another important way—we can deliver it faster.

We'd be happy to send you a sub-set of those benchmarks which are non-proprietary or have been released with permission, so you can run them yourself. We'll also send you hardware and software documentation.

Before you make a decision on any supermini system, get all the facts on the new 3240 from Perkin-Elmer.

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Panel Reviews Impact of Warc on U.S. Carriers

By Phil Hirsch
CW Washington Bureau

MIAMI BEACH, Fla. — An important result of the recent World Administrative Radio Conference (Warc) in Geneva, Switzerland was expansion of the frequency band many satellite communications carriers will use within the next few years for "downlink" transmission between their satellites and earth stations, Ronald F. Stowe said here recently.

Stowe, assistant general counsel of Satellite Business Systems (SBS), was part of an Interface '80 panel that discussed "What Warc Decisions Mean to U.S. Users."

The expansion affects what had been 11.7 GHz to 12.2 GHz band. In addition to the band's being extended to 12.7 GHz, the allocation of frequencies within the band was altered. Additional communications satellites can now be positioned in geosynchronous orbit above North America, greatly increasing the number of channels available to satellite communications users.

Under the former allocation scheme, Stowe explained, there were no more than six orbital positions available to satellite carriers planning to use the 12GHz downlink band for communicating with U.S. and Canadian earth stations. Under the new arrangement, by comparison, the total number of available slots is at least 18 and may be as high as 30.

Some problems remain, however, Stowe said. The less-developed countries (LDC) want orbital positions preassigned rather than allocated on the present first-come, first-served basis. At an upcoming Warc-sponsored meeting in 1984, they can be expected to continue pushing for acceptance of their plan.

The U.S. opposes preallocation because it results in inefficient use of scarce spectrum capacity and inhibits development of new technology.

Underlying the change in the 12GHz allocation is the near-saturation of the 4/6GHz band, the one now generally used by satellite communications carriers. Some U.S. carriers, as a result, are rationing circuits among their customers.

Another problem, Stowe reported, is that "Satellite services must share the 4 GHz band with terrestrial microwave services. . . . The consequence . . . is that earth stations must frequently be placed at considerable distances from the [user]."

The U.S. does not have as many Warc votes as the LDCs, however, so "we will have to come up with a practical, credible alternative to preallocation," Stowe said. He suggested that users, carriers and government officials begin working on this problem immediately.

Telecommunications Opec?

The preallocation issue is part of a much broader telecommunications battle between the developed and less-developed nations that was supposed to occur at the Warc meeting, but did not. Nevertheless, it is likely to emerge at a number of meetings scheduled during the next few years to give final approval to general decisions reached in Geneva.

Another speaker at the Interface '80 session, Francis S. Urbany, who was vice-chairman of the U.S. delegation, talked about the possibility of a "telecommunications Opec" developing among the nations located along the equator. The space above the equator is the best place to position modern communication satellites, he explained.

Equatorial nations are claiming ownership of this space in the hope they can rent it to satellite system operators in the developed nations.

Overall Success

Panelist H.E. Weppler, director of technical standards and regulatory planning for AT&T, said one important result of Warc was that the existing allocation of microwave frequencies was left essentially unchanged, despite strenuous efforts by a number of countries to change them. Seventy percent of U.S. long-distance telecommunications are supported by these frequencies, he pointed out.

Weppler agreed with the other panelists — who included John Eger and Terry Mahn, two communications attorneys (Eger was also telecommunications adviser to Presidents Ford and Nixon) — that generally the U.S. did pretty well at Warc, despite advance predictions that its delegation would be unable to cope with the LDCs' greater voting power.

One reason for this success, Urbany said, was careful advance planning. He explained that the U.S. delegations made preconference visits to some 50 countries, including several developing countries. The U.S. offered to help them develop their telecommunications technology, and this led to a close rapport between the U.S. and at least some LDCs at the conference.

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Digi-Log Has Passive, Interactive Line Monitors

HORSHAM, Pa. — A data communications line monitor is available from Digi-Log Systems, Inc. in passive and interactive versions as a tool for maintenance and control of networks.

Replacing Digi-Log's DLM II monitor, the DLM III features a 5-in. CRT screen for visual fault analysis and supports an external Ascii serial printer.

The passive model offers an 8K-byte memory for monitoring and trap capabilities as well as printer output. The interactive version additionally offers bit error rate tests and capabilities for simulation of modems, terminals and communications processors, a spokesman stated.

Both models accommodate Digi-Log's Tapetrap, a programmable fault storage unit that selectively stores up to one million characters on a 3M Co. cartridge, allowing the troubleshooter to capture questionable streams for fault analysis.

Supported Protocols

Protocols supported by the DLM III include High-Level Data Link Control, X.25, Teletype Corp., IBM bisynchronous and IBM Synchronous Data Link Control.

The monitor can select synchronous and asynchronous transmission speeds in the 50- to 19.2K bit/sec range, including "nonstandard" rates within that range, the spokesman maintained.

'Suitable Companion'

Weighing just 17 lbs, the DLM III comes with a carrying handle and dust cover and is also available as a rack-mounted unit for fixed installations. Digi-Log called the monitor a suitable companion to its Network Supervisory System announced last year [CW, Nov. 12].

With the DLM III, one or two independently variable synchronous characters are programmable. In half- or full-duplex modes, the monitor can capture transmissions received from a local modem or from the local terminal/-CPU in Ascii, Ebcdic and other formats.

The unit's 8K-byte memory captures up to 250 displayable lines when bit streams are monitored, the spokesman said. RS-232C and V.24 interfaces are standard, while RS-449, Mil standard 188 and current-loop interfaces are optional.

The monitor-only, passive model costs $2,990. The interactive DLM III costs $3,575. Digi-Log is located on Babylon Road in Horsham, Pa. 19044.

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Comm-Stor Users Gain Support For 8A1 Protocol

ROCHESTER, N.Y. — An 8A1 protocol communications line controller that polls private-line message stations and directs message traffic from the source terminals to the destination terminals is available from Sykes Datatronics, Inc.

The Comm-Stor 8A1 line controller and the Comm-Stor 8A1/8B1 message station recently introduced by Sykes [CW, Feb. 4] permit a common carrier or communications equipment distributor to market a complete set of equipment for private-line message networks, a spokesman said.

Featuring a temporary message storage capacity of more than 200,000 bytes (or up to 1,000 messages), the 8A1 line controller communicates asynchronously at up to 1,800 bit/sec or synchronously at up to 2,400 bit/sec.

Remote Capability

A remote computer can dial into the line controller, making it and its network appear as a remote cluster, the spokesman continued. A basic network will support up to 50 stations.

Sykes said the unit will cost about $10,000 when it becomes available this August.

The vendor has also released a floppy disk-based telephone management system called Comm-Stor/SMDR for use in tracking telephone bills incurred by each telephone unit on a company's premises.

Comm-Stor/SMDR will cost less than $10,000 when deliveries begin this June, Sykes noted from 375 Orchard St., Rochester, N.Y. 14606.

Complex Effort Completed in a Year

Bank Credits Conversion Success to Users

BALTIMORE — The "most complex conversion ever undertaken within a one-year time period by a major corporation"— in the words of several major hardware vendors — was successfully completed at Maryland National Bank here two years ago.

Maryland National Bank is a one-bank holding company with 146 branches statewide and $3 billion in assets. It is reportedly the largest full-service bank in a four-state area.

In 1976, corporate management reviewed the bank's existing hardware and application systems and concluded that a change was due — one that would put Maryland National "more effectively into the same operating environment as other major banks," according to John Singleton, senior vice-president of DP/bank operations services.

Along with three other vice-presidents, Singleton was faced with a job that had to be completed within rigid budget constraints during a one-year period.

The job entailed:

- Converting, upgrading or replacing with packages the bank's 29 major existing application systems from two duplexed Burroughs Corp. B6700s to an IBM 370/158, Amdahl Corp. 470V/5 and Storage Technology Corp. (STC) I/O devices.
- Replacing the five largest application systems with "new improved systems" without allowing the existing Burroughs systems' performance to deteriorate.
- Developing and implementing all application systems maintenance, necessary legal changes and priority enhancements requested by in-house users.
- Cost-justifying the Management Science staff by a ratio of "at least two hard dollars of savings for every dollar of expense."
- Raising all hardware application systems and on-line system performance "to users' satisfaction" and to "new tough standards" and then maintaining them for IBM, Amdahl, STC and Burroughs.
- Completing all the required training and upgrading of the Burroughs-experienced DP staffs and avoiding any expense overlap of the Burroughs equipment in installing the IBM computer.
- Improving the unacceptable check-processing hardware performance to national standards or better and making both the DP Services and the Profit/Loss Departments profitable "for the first time."

Challenging Constraints

If those tasks sound challenging, they were made even more difficult by a number of constraints, including a 5% budget reduction during the year and the

(Continued on Page 58)

Price Not Only User Consideration When Choosing Nonimpact Printer

In "Report Finds PPS I Best Nonimpact Printer Buy" [CW Feb. 25], the importance of price was emphasized as the main justification for choosing one high-speed nonimpact printer over another.

The story was drawn from a draft report entitled "High-Speed Nonimpact Printers at Central Computer Sites" from International Data Corp. (IDC), a Massachusetts-based consulting firm. The report, which has since been published with current prices, is a complex analysis of the many factors critical to the selection of a high-speed nonimpact printer.

According to IDC's Judith S. Hurwitz, it is incorrect to make a judgment simply on a direct price comparison. Issues such as the type of paper, price of supplies, communications ability and the ability to tie in with other types of equipment are also important, as is the capability of a machine to design custom forms.

By Judith S. Hurwitz
Special to CW

Because of large corporations' growing need to acquire faster means of putting information onto paper, the market for high-speed nonimpact printers is expected to grow at an increasingly rapid pace. These users are choosing high-speed nonimpact printers based on ink-jet, laser and xerographic technologies because they are fast and quiet and need less maintenance than impact printers.

The market for high-speed nonimpact printers is expected to grow at a dramatic rate from a total of 1,950 installations last year to 6,400 by the end of 1984, a 228% growth rate. This is the finding of the "High-Speed Nonimpact Printers at Central Computer Sites," a market study recently published by IDC that details the competition in this market for printers with speeds of more than 4,000 line/min.

For example, where last year there were only four vendors in the market, today nine high-speed nonimpact printers are available.

Top Competitors

The top competitors in this market are currently IBM with its 3800, the Xerox Corp. 1200, which has been discontinued and replaced with the 9700, and the Honeywell, Inc. Page Printing Systems (PPS) I and II. With the exception of the recently announced 9700, all have been on the market for several years.

The printer which IDC predicted will dominate by 1983 is the IBM 3800, which will control 48% of the market. The newest

(Continued on Page 59)

Symposium to Explore Mass Storage

DENVER — The fourth Institute of Electrical and Electronics Engineers (IEEE) Symposium on Mass Storage is scheduled for April 15-17 at the Regency Inn here.

The workshop will explore the impact of diverse data types — such as textual data, scanned images and vectorized data — on the design and utilization of mass storage systems. Current efforts toward standardization and interface definition will be examined along with the more conventional technical issues, according to a spokesman.

The preregistration fee is $90 for IEEE members, $120 for nonmembers and $25 for students. Registration at the door is $10 more in all categories. The fee covers a reception, refreshments and two breakfast meetings.

Those wishing to register can contact Karen Friedman, NCAR, P.O. Box 3000, Boulder, Colo. 80303.

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Graphics System Expected To Triple Architects' Output

SSOE's interactive graphics system features terminals with dual CRT screens.

TOLEDO, Ohio — A computer-based graphics design system is expected to triple the productivity of architects, engineers and technicians at the architectural firm here of Samborn, Steketee, Otis and Evans, Inc. (SSOE) within a year.

The turnkey system is manufactured by M&S Computing of Huntsville, Ala. Powered by a 256K-byte Digital Equipment Corp. PDP-11/70, it also includes a California Computer Products, Inc. 960 high-speed plotter, two Ampex Corp. 300M-byte disk drives and four M&S-designed terminals with two Tektronix, Inc. CRTs mounted on each.

Using the system, design draftpersons can put a building's characteristics, such as room dimensions, locations of wiring and plumbing and ceiling and window heights, on the CRTs for evaluation. The information can be stored in the PDP-11/70 and recalled as the drawing is done. The final drawings are produced on the plotter.

The system can produce in 15 hours a drawing that normally requires 45 hours to produce manually with conventional methods.

According to Marlin Pritchard, graphics systems manager at SSOE, M&S was chosen to supply the system over Applicon, Inc. and Autotrol Corp. because of its software and data base management capabilities. "The real key to graphics systems is the software and dual screens," Pritchard said.

The dual-screen terminals facilitate the design process by allowing the operator to isolate certain building elements on one screen while keeping an image of the master plan on the other. This means the operator does not have to "zoom in" and "zoom out" whenever he wants to switch from specific elements to the master plan, Pritchard explained.

Instead of drawing only one discipline on a sheet, the computer can lay one drawing over another, forming a composite package of drawings for the structural framing, heating, ventilating, air conditioning, plumbing, electrical and concrete elements of a building. This allows engineers to check potential interferences that might occur between any of those elements.

'Utility Mapping'

Another of the system's unique functions is "utility mapping." This is the computer's way of packaging (in layers of drawings) all of a community's gas, electrical, water and other utility lines.

For example, a municipal power company methodically records its underground electrical cables. The municipality maintains a jumble of drawings that show the locations of water and sewer lines, while the local gas company keeps and updates its own maze of piping drawings.

Years later when a problem develops, it is almost impossible to decipher the exact locations of all utilities from the mass of drawings accumulated and filed in the various locations.

The SSOE system can store all of the information in its memory, recall it at any time and produce one drawing that shows all utilities, eliminating the need to wade through piles of usually outdated drawings.

The system's built-in memory eliminates the need to rework drawings by hand when changes are required. It also provides retrieval of information at a later time when SSOE clients may want to remodel or expand their facilities. It thus solves the problem of storing and filing drawings and/or microfilm because all of the building information is stored on computer tape.

The first project to be produced with the system is a machining-shipping building for the Union Carbide Corp. The building is one in a $100 million manufacturing complex designed by SSOE over the past two years for Union Carbide in Clarksville, Tenn.

While you're waiting, Wang's VS could be working.

If you're waiting for an IBM System 34 or 38, you've got a lot of time on your hands. So why not take a few minutes and closely consider just what you'll be getting a year or two down the road. Most importantly, consider your options.

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Best of all, Wang's VS gives you the flexibility to grow from a minimum VS configuration to a full-blown system with the power of a high-end 370, without reprogramming or major equipment swap-outs. Plus the ability to do data processing and word processing at the same Wang terminal. *All this now*, for no more than you'll pay for a System 34 or 38 next year.

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And because source information stored in superdense microimages can be linked to complementary indexes in your on-line data base, you can reduce the cost of keeping non-dynamic information in a dynamic state.

The choice, then, is a simple one.

You can increase the productivity of your computer by buying *more* expensive and sophisticated data-storage equipment, in order to handle growing information demands.

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Bank Completes Complex Conversion in Year

(Continued from Page 55)

elimination of the "open positions" on the DP staff — a 13% reduction, Singleton recalled.

Furthermore, there was an on-board DP staffing level of 37 fewer people than the previous high authorized complement level, he added.

Key to Success

While planning, management, technical expertise and experience were paramount to the success of the conversion effort, the real key to the project's success was the "incredible support" of the users, according to Singleton, "even to the extent that they contributed some of their direct expense funds in a flat budget year."

But more importantly, users held maintenance and enhancement requests "down to a bare minimum without complaining."

How did the team get such cooperation from other personnel? "We simply made them partners in terms of open and honest two-way communications involving all our plans, constraints and trade-offs along the way as they came up," Singleton explained.

Applications Project and Conversion Teams were comprised of users and DP staff, precluding the typical "we/-they" syndrome. In addition, responsibilities, schedules and interdependencies were documented for all members "with relentless follow-up by four levels of management," Singleton said.

Biweekly user meetings were held to evaluate progress and problems. A Senior Automation Committee reviewed any requests for enhancements or changes to the conversion plan.

Show of Support

Besides the users, management gave the group "total backing . . . from the chairman on down, and not just when things went well," Singleton noted. "For example, when we realized that because of significant volume increases and changes to application packages requiring much more testing, upgrading to a 370/158-AP might not allow us to make the schedule or provide a safe range of parallel testing for systems cut-over, management approved a nonbudgeted Amdahl 470V/5.

"It took guts to add an Amdahl instead of upgrading our 158 — we knew what the consequences would be with IBM removing its support," he added. "That show of confidence in us by executive management went a long way in motivating our people to do a job that, on paper, we weren't capable of accomplishing."

In converting, "our main purpose was to avoid the pitfalls of trying to have the same people accomplish maintenance, enhancements, development, install packages and filter existing systems," Singleton said. "Each department was given a single functional responsibility to accomplish, rather than the gamut of typical DP tasks."

And, finally, it was the "dedication and enthusiasm" of the DP staff that led to success — an aspect that "isn't really found in planning, management systems or any formal management or technical techniques," Singleton concluded.

Burroughs CPUs Gain Printer

STAMFORD, Conn. — A 1,250 line/min drum printer designed to economically replace Burroughs Corp. 250-, 1,100- and 1,500 line/min printers has been announced by Digital Associates Corp. (DAC).

The Model D-2470 can be used with virtually any Burroughs computer, a DAC spokesman said.

The D-2470 costs $27,950 from DAC at 1039 E. Main St., Stamford, Conn. 06902.

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Firm Refurbishes Disk Heads

BELMONT, Calif. — Trans Datacorp has expanded its refurbishment services to include Control Data Corp. disk drive flying-head assemblies for what it said is less than one-fourth the cost of new heads and fewer than 30 days' turnaround time.

Trans Datacorp is at 1717 Old County Road, Belmont, Calif. 94002.

Printers: Price Not the Only Factor

(Continued from Page 55)

entry, the Xerox 9700, will control 31% of the market, followed by the Honeywell PPS I and II, which will maintain a steady market share of 11%.

Because Xerox has stopped manufacturing the 1200, its market share will drop to only 3%.

Of all the high-speed nonimpact printers discussed in the report, the least expensive is the PPS I, which costs $31,606 compared with $36,300 for the IBM 3800 and $35,240 for the Xerox 9700. However, paper costs associated with the PPS remain its most serious drawback.

In addition, in order to create custom forms on the PPS, individual printing drums must be ordered for $335 each.

On the other hand, forms on the Xerox 9700 are software-controlled and therefore only programming costs are involved.

Further, users tend to prefer the plain paper used with both the Xerox 9700 and the IBM 3800 to the coated dielectric paper used with the PPS, the study found.

Besides user acceptance problems, the price of coated paper is considerably more than the plain paper used on the other printers mentioned in the report. Dielectric paper for the PPS costs .0068 cent/sheet compared to .0043 cent/sheet for the IBM 3800 and .0043 cent/sheet for the Xerox 9700.

In addition, the PPS cannot be tied into a word processing system while a Xerox 9700 can.

Another important factor distinguishing the various printers is the different methods each printer uses to handle paper. The Xerox 1200 and 9700 and the PPS all use cut sheets. However, the PPS relies on rolls of paper.

The IBM 3800, on the other hand, relies on continuous-forms paper. For future applications in the office, the cut-sheet format shows more potential.

Where the high-speed products on the market today are primarily based on laser or xerographic technologies, many products are expected to be introduced in the lower end of the nonimpact market based on ink-jet printing. In addition, some other companies such as Cannon U.S.A. are attempting to market low-speed laser printing products.

Price Changes

Since the nonimpact printer chart was prepared for the CW Feb. 25 Special Report, price changes would affect users' monthly costs as follows:

- IBM 3800 paper costs would be $15,000, the user charge $6,810 and the equipment charge, $14,730.
- For the Honeywell PPS, monthly equipment and maintenance charges would be $9,240 and $1,336, respectively.
- For the IBM 1403 using single-ply paper, paper charges would be $19,500 and ribbon costs, $1,440.
- The monthly developer cost for the Xerox 1200 should have been $780, not $1,780.

Information on obtaining the complete report is available from Judith S. Hurwitz, Researcher, Computer Output Program, International Data Corp., 214 Third Ave., Waltham, Mass. 02254.

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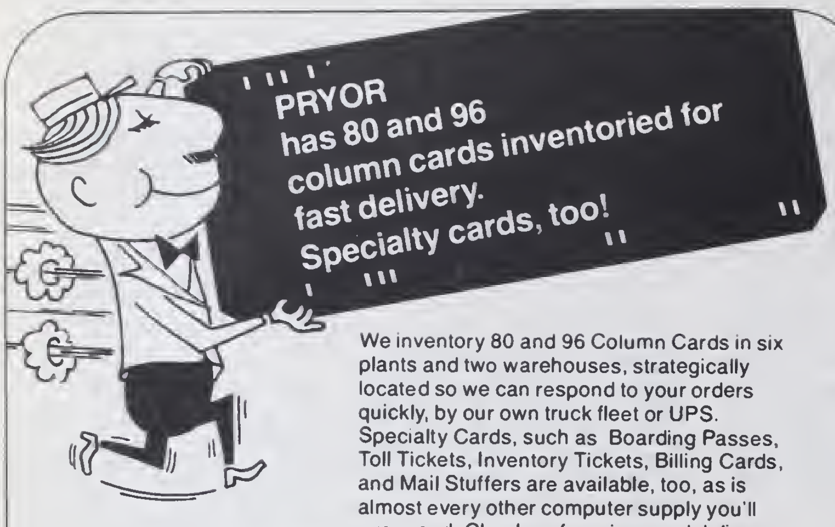

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CW-80

Switch From Cards to CRTs Brings Productivity Boost For Industrial Manufacturer

HOUSTON — An industrial plant's switch from a punch card-based data collection system to a CRT-based system has resulted in increased output per man-hour and improved plant productivity.

Baker Packers, a division of Baker Oil Tools Co., manufactures "packers" — "downhole" equipment for oil well control. It makes some 20,000 component parts that are assembled into complex, pipe-like devices, both standard and customized.

Two hundred production workers run 70 machines, including many numerically controlled units. Each machine is a work center, and these are grouped into 14 cost centers.

While the plant is scheduled and loaded well in advance to produce forecasted needs for Baker's nearly 60 field sales offices and warehouses, the nature of the petroleum exploration industry dictates that the firm must be able to "react to emergencies," according to John T. Madden, production manager.

When a customer is digging a well, the objective is to bring the oil and gas to the surface as free of contaminants as possible and in an efficient flow path. Proper placement of the right packers assists in both these functions.

The oil well environment is unpredictable, however; a customer may have one type of packer on hand but need another. To shut down operations while waiting for the appropriate equipment would cost thousands of dollars per hour.

"As a result, we are continuously rescheduling our operation, which is just a big job shop," Madden explained. "A high-priority job can cause us to reschedule three to four production machines that were already fully scheduled."

Problem With Reliability

An effective communications system is therefore essential to the firm. After working for 11 years with an RCA Corp. system that fed shop and scheduling data to the computer via tape through a compiler, in 1972 Baker installed a punch card-based system from Mohawk Data Sciences Corp. (MDS) that handled 1,500 transactions daily.

Error-prone and plagued by downtime and erratic operation, the (MDC) system became less and less reliable, Madden recalled. Production workers and foremen depended more and more on time-consuming manual entries, which were inherently inaccurate, he said.

Consequently, the number of transactions that had to be keypunched each night ranged from 250 to 400, resulting in "lagging, inaccurate shop-floor data that couldn't be trusted as input for payroll, job-progress reporting or production scheduling."

After "several months" of studying various systems to replace the MDS system, the firm narrowed down its choices to IBM and one other vendor that Madden "couldn't recall." It was the IBM system's "reputed reliability and use of encoded cards for speed and accuracy" that convinced Baker Packers to go with it.

The plant installed an IBM 3630 Plant Communications System with 3640 terminals utilizing magnetic-stripe technology last June. Conversion was "exceptionally smooth," according to Madden, and the workers were willing to try it.

Keypunched transactions have been cut from a range of 250 to 400 to a range of 40 to 50 per night, "and these are mostly intentional — entries from the 'rework' area where manual cards are the norm," Madden explained.

Besides increasing output per man-hour, the system has also decreased product waiting time "because our Capacity Planning and Operations Sequencing System [Caposs] receives accurate data an average of 24 hours sooner than in the past as a result of reduced need for error corrections" Madden noted.

"IBM's Caposs helps us better utilize facilities and manpower and helps boost production without undue cost increases," he added. Equipment at the Houston plant includes 13 Model 3641 reporting terminals with slot readers. They accept data from magnetically striped employee badges, machine cards and work-order cards. A 22-character display leads the worker through the procedure in the proper sequence.

Ten of the terminals are in plant production, one is in the warehouse, one in receiving and one in the computer room.

Other equipment includes two IBM 3642 magnetic-stripe encoder printers located in production/inventory control and in DP, each with a Model 3643 interactive keyboard CRT terminal alongside. This equipment is used for inquiry and to produce the magnetically striped working documents on an exception basis. The majority of the documents are batch produced on Baker Packers' 370/158 mainframe.

The company also has an IBM 3645 printer in the shop-order completion area to log the plant collection system transactions and a Model 3631 controller to coordinate communications between the terminals and the 370/158.

'Loop' Technology

The 3630 system uses "loop" communications technology, which permits the attachment of both local and remote terminals in such a way that the need for separate cabling to each is eliminated. The 3630 system now communicates to a diskette unit that is "dumped" twice a day to the 370. The computer runs a labor pass at the end of the first shift to correct input errors, then produces a daily labor production report at midnight.

Also produced are a daily summary by cost center and shift; a daily operations run list showing orders to be run over the next five days; and a daily order schedule that also flags orders behind schedule.

Weekly labor summaries by employee and by shift, a weekly order status report and a weekly Caposs report showing the expected work load

(Continued on Page 62)

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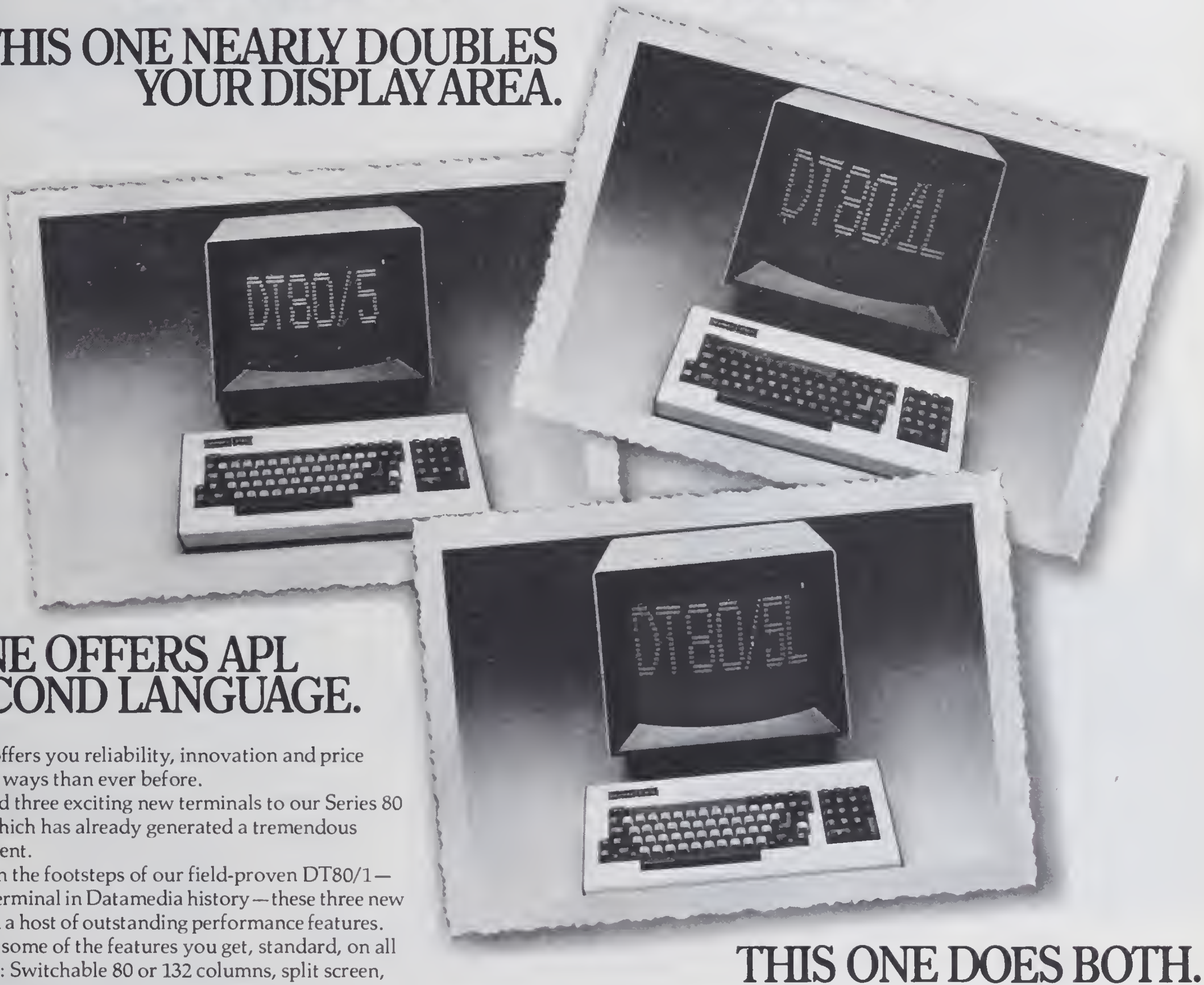

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Power Control Unit Handles 10 Devices

SANTA ANA, Calif. — Three models of a power controller that can reportedly provide clean, filtered power to up to 10 devices from a single ac outlet are available from Marway Products, Inc.

Aimed at users of computer systems as well as of industrial electronics devices and test equipment systems, the MPD 110/220 series from 15A systems is a rack-mountable unit that provides eight switched and two direct ac receptacles, a Marway spokesman said.

The series includes three models: the MPD 110 for 115 Vac/15A applications; the MPD 220 for 230 Vac.15A applications; and the MPD 2010 for 230 Vac/15A (four-wire) input with 115 Vac/15A outputs.

The MPD 110 costs $129, the MPD 220 costs $199 and the MPD 2010 costs $154. The remote option costs $60 and the EMI filter is $25. OEM and quantity discounts are available.

An 8.5-ft power cord and cabinet ground wire are included, and the product is backed by a 90-day limited warranty. Marway is located at 2421 S. Birch St., Santa Ana, Calif. 92707.

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On-Line System Embosses Plastic

LOS ANGELES — An on-line system that produces embossed plastic cards directly from a computer without operator involvement has been introduced by the Addressograph Division of AM International.

Designed primarily for retail and petroleum companies that issue their own credit or access cards, the system can also be used for embossing plastic product and personnel identification plates, according to a company spokesman.

The modular embossing system consists of an Addressograph Model 6600 electronic embosser, a microprocessor-based interface and an automatic card feeder. Customers can choose from a variety of embossing formats, the spokesman said.

Model 6600 Embossing System

The electronic interface, which links the system to a computer, is equipped with its own keyboard, CRT and memory. The CRT can display a total of 1,024 char. — up to 16 lines of 64 char. each.

Format changes are accomplished by a keystroke on the interface keyboard as are other system changes.

Both the electronic interface and the automatic feeder are available separately and can be retrofitted to currently installed AM Model 6600 embossers.

System prices range from $13,500 to $19,500. AM International is located at 1900 Ave. of the Stars, Los Angeles, Calif. 90067.

Printer Package Includes S-100 Micro Interface

SAN RAFAEL, Calif. — A combination file management/S-100 interface/printer package is being offered by Micropro International Corp. for about $600 less than the units' total separate costs.

Combined are the Micropro Word Star word processing software, the I/O Master interface board and the 55 char./sec NEC Spinwriter parallel printer for a price of $3,195.

Features include the capability to simultaneously use high-speed line printers (Centronics Data Computer Corp.- or Dataproducts Corp-compatible) and dual synchronous/asynchronous serial ports with Fifo buffering to prevent loss of keystrokes during disk I/O and MP/M task switching, a company spokesman claimed.

Also featured are an eight-level interrupt controller and dual interval timer circuitry.

Micropro is headquartered at 1299 Fourth St., San Rafael, Calif. 94901.

Switch Hikes Productivity

(Continued from Page 60)

on each work center are also produced.

Expected to go on-line with the 3630 system by mid-year, the system then will be an interactive shop-floor control system. "This will permit immediate validation of all input, immediate inquiry via terminals in strategic shop areas and will bring production people and superintendents completely up-to-date with what's happening on the shop floor," Madden projected.

The same system was installed in Baker Packers' Los Angeles plan complex last July and will go into operation in a new plant in Broken Arrow, Okla., in the spring.

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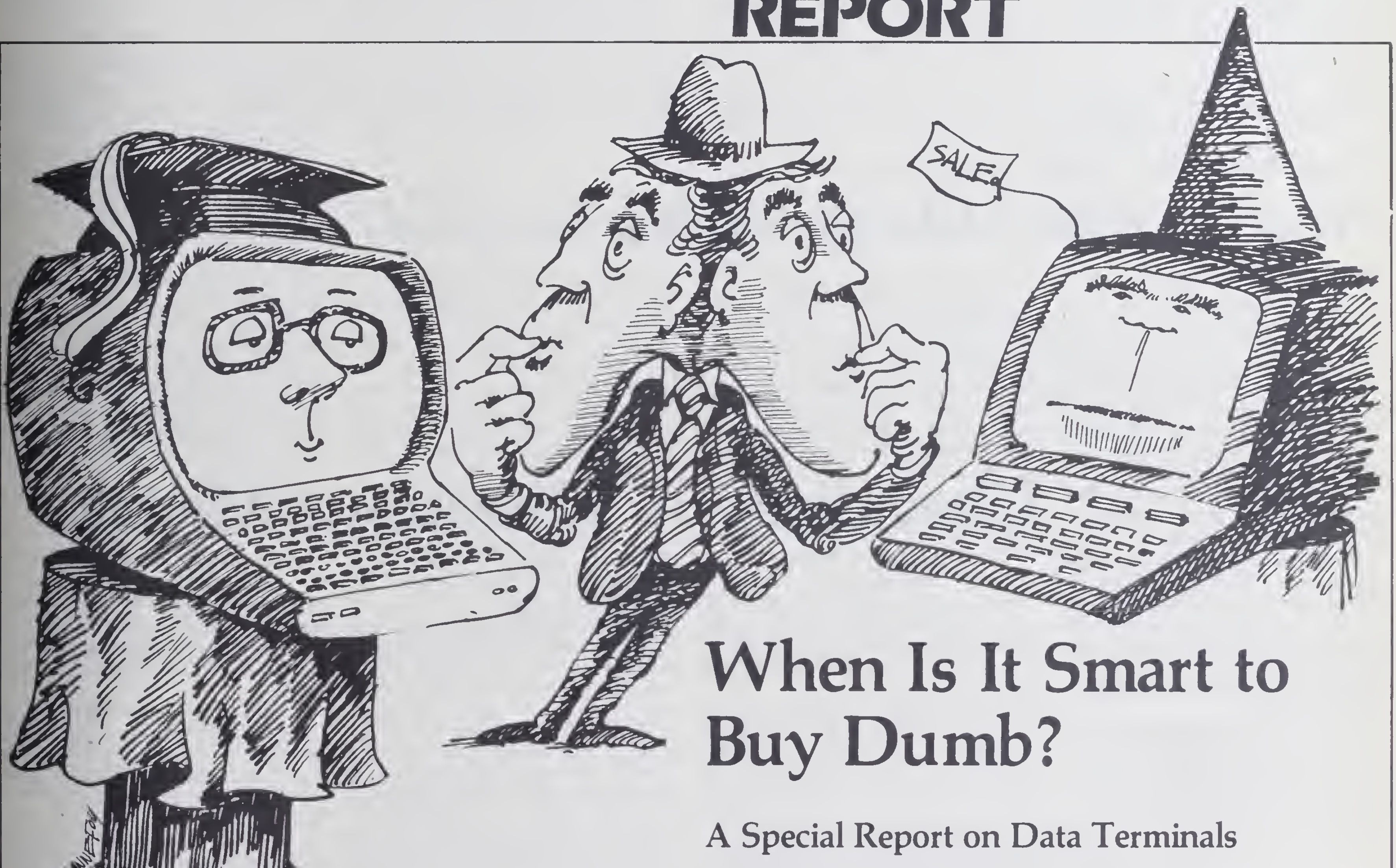

When Is It Smart to Buy Dumb?

A Special Report on Data Terminals

Edited by Brad Schultz

COMPUTERWORLD

Consequence of Micro Advances

Terminals to Follow 'Fixed' Course in 1980s

By Robert E. Montemerlo
Special to CW

As we look to the 1980s, the course of terminal products appears set. The next generation of terminals can best be termed "fixed function," for they will apply limited levels of intelligence, storage and functionality to particular kinds of work.

In part, the trend is a consequence of advances in microprocessor technology that allow terminals to feature some degree of computing power without costing much more than conventional models. The user will only pay incrementally for the capability required, such as data storage or communications buffering.

Other factors that account for this trend are the advent of cost-effective, nonvolatile storage technologies for terminals — such as bubble and charge-coupled device memories — and the price erosion of entrenched technologies.

Put another way, during the past decade the terminal products employed by the DP/data communications industry have undergone major technology changes oriented toward improving the interfaces between man and machine and between machine and machine.

Increased Functionality

As microprocessor technology advanced, hard-copy teleprinters matured from discrete component circuitry controlling heavily mechanized printers to servo-driven, highly flexible products. Soft-copy terminals were enhanced to provide a higher level of features and functionality using state-of-the-art microprocessor design.

The implementation of this design structure into terminals opened an entirely new market for a multitude of additional functionality features at a very small cost increment. Instead of the market reaction predicted by most manufacturers for cost-driven, limited-functionality terminals, the users demanded more functionality at a fixed cost.

Hence, teleprinter performance in terms of transmission speed went from 110- to 300 bit/sec, and then from 300- to 1,200 bit/sec. Video terminals segmented into low- and high-functionality marketplaces, with the high-functionality products including such features as 132-column displays, smooth scrolling and expanded character fonts.

Moreover, both video and hard-copy terminals were given more sophisticated communications capabilities — including extensive modem support — and standardized tabulation features recognized by the American National Standards Institute.

The resulting increase of functionality at a virtually constant market price (actually a decreasing price in light of inflation) has produced an accelerated rate of growth for the terminal products market.

Smart vs. Intelligent

The distinction between a "smart" terminal and an "intellegent" terminal may well be restricted to implementation. If functionality is supplied by a manufacturer via a cartridge, diskette or module, it can be considered smart. If the user has the ability to develop and implement functionality, it can be considered intelligent.

The functionality encompassed by this next generation of terminal products falls into three categories: the operator/machine interplay, local data manipulation and communication network compatibility. In order to meet the market requirements of the next decade, the three areas of functionality must be comprehensive and interrelate

(Continued on SR/14)

Choice Involves Detailed Analysis

What Qualities Make the Perfect Terminal?

By Gerald W. Williams
Special to CW

Selecting the perfect terminal is not a simple task. Terminals are among the most important elements of any data processing system. Regardless of the system's sophistication, a user forced to struggle with a terminal that is difficult to operate will usually react negatively to the entire system.

The terminal purchaser must use essentially the same method he would to purchase an entire system.

He must analyze the functions to be performed as well as calculate the application's life expectancy, determine the impact long-range corporate plans will have on the equipment and anticipate the impact of future technologies on the functions that equipment will support.

En route to deciding what terminal to buy, the purchaser must choose between the categories of teleprinters, display terminals and special-purpose terminals. He must also weigh the advantages and disadvantages of using a dumb terminal or an intelligent terminal.

To confuse the poor fellow further, there are more than 150 vendors with more than 500 models of terminals from which to choose. All those vendors are competing for the user's attention.

Education is the first step in any selection process. Before selecting a terminal, the purchaser should know the basic capabilities of terminals and the needs and priorities of his company. All terminals, regardless of their capabilities, serve one fundamental purpose: they allow a user to send information to and from the central processor.

The nature of the information sent or received and the manner in which that information is handled by the terminal operator will determine the level of technology desirable in a terminal.

Types of Terminals

Terminals can generally be identified as dumb or intelligent. Dumb terminals provide specific input/output functions and may include such elementary features as cursor control, but they basically remain I/O devices.

In contrast, the more expensive microprocessor-based intelligent terminals allow the user to alter some of the terminal's functions. Further, intelligent terminals with displays offer more visual features such as blinking, video reverse and highlighting. And their communications capabilities are more extensive than those that come with dumb terminals. Intelligent units usually support the attachment of a slave printer.

There are three categories of intelligent terminal: clever, smart and bright. *Clever* terminals allow the user to alter a limited number of well-defined functions. Such changes are

(Continued on SR/10)

Checklists: A 'Disastrous Mistake'

By Roger S. Pincus
Special to CW

The current profusion of terminals and the wide divergence of their capabilities make it almost impossible to clearly delineate the differences among these terminals.

This fact makes it difficult to put easy handles (such as dumb, smart or intelligent) onto terminals. It further confuses an already complex task of knowing when, how and where to use the wide-ranging terminal options available to today's user.

In addition, this situation often leads to the simplistic selection procedure of finding the lowest-cost product that meets a list of three-word terminal capability descriptions.

And that can lead to the single most disastrous mistake made by many terminal purchasers: The use of the "checklist" approach to terminal selection.

There are four areas in which microprocessor-based-often called "smart" — terminals offer capabilities and features that distinguish them from traditional conversational — "dumb" — terminals. These differences indicate important keys to their proper utilization.

Further analysis provides insight into the ways different microprocessor-based terminals vary in their capabilities. Understanding where the capabilities of these different terminals start and end makes their efficient use quite simple.

The challenge, of course, lies in clearly understanding those differences despite the lack of any standards by which to measure the figurative terminology batted about by today's vendors.

The earliest forms of extended terminal capabilities are those which allow

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After Deciding You Need CRTs, What Next?

By Phil Shires
Special to CW

The DP manager has determined that installing CRT terminals is the most economical and effective means of meeting the organization's requirements for efficient operations. Now what?

With an overwhelming variety of terminals available today, selecting the type of product most qualified for the job can become a mind-boggling job. It involves much more work than merely identifying desirable features and buying the lowest cost terminal with those characteristics.

The industry has divided the myriad of terminal offerings into three classes — dumb, smart and intelligent — although there is variation within each category. At the lowest end, dumb terminals serve as basic input/output devices; each has a display screen, a keyboard and a means of communications with the host CPU. They sell for less than $1,000 each.

Smart terminals have additional characteristics but lack user programmability. These smart features include visual attributes (such as blinking, blanking and underlining), block transmission, editing functions, more sophisticated communications and screen memory, to name a few.

The cost of smart terminals will range from about $1,000 to $5,000.

User programmability is the key to intelligent terminals. These units must have a microprocessor, random access memory and a resident high-level language or assembly language. The price of an intelligent terminal can be as high as $25,000.

Most Important Criterion

Once the above definitions are understood, the solution to the terminal selection dilemma lies in analyzing the applications for the terminals, the size of the computer system, the DP experience of the actual users and the allotted budget.

Applications are probably the most important criterion for choosing a terminal. What functions will the terminal have? What qualifications does it need to complete those tasks in the most efficient manner? These are the basic issues.

Here, the user's software becomes significant. The computer itself can be programmed to perform certain smart terminal functions; the manager has the option of buying a dumb terminal and programming the host CPU or purchasing a smart terminal with those capabilities built in.

In most small business applications, for example, the user is doing accounts receivable, accounts payable, payroll and inventory. Packaged software can usually be purchased so all of the applications are performed by the computer. In that case, a dumb terminal is all that is necessary.

But a given user may want a reverse video mode for such purposes as display of low-stock items in an inventory application. That would be a smart terminal feature.

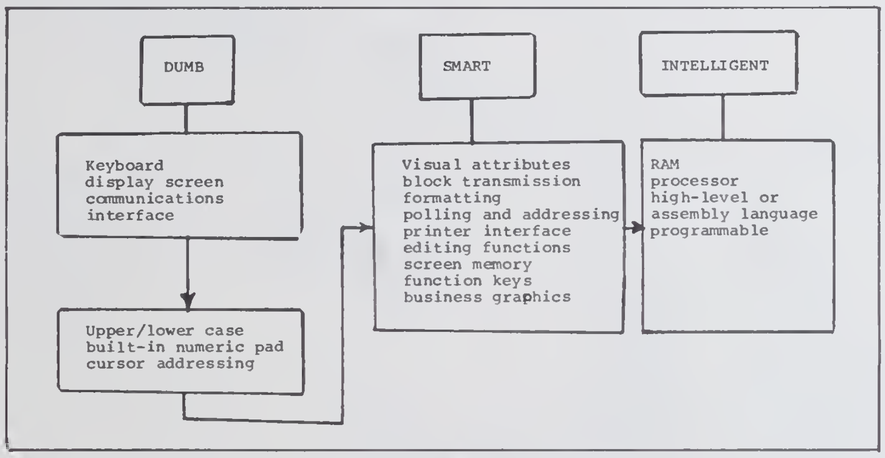
Primary vs. Secondary

Another consideration involves primary vs. secondary applications. If a system is primarily dedicated to accounting functions but the user also wants to do some word processing, then editing functions come into play.

The user may not want to tie up the computer's memory for editing in order to reserve it for priority applications. In that case, a smart terminal would be the appropriate choice.

If word processing is the primary application, however, then it would probably be more cost-effective to program the application into the computer and use a less expensive dumb terminal.

Intelligent terminals are usually required for dispersed or distributed DP applications where much of the processing is done at a remote site. An intelligent terminal is also the answer when a smart terminal is not sophisticated enough to perform the tasks. Some processing is needed, but an entire minicomputer system is not warranted.



Terminal Classifications

Size of Operation

Besides applications, the size and type of the computer operation will help determine the appropriate kind of CRT terminal. Computer operations can be categorized into five basic divisions:

- Time sharing
- A single-user system consisting of one CPU and one terminal.
- A multiuser system at one facility with many terminals linked on line to the CPU.
- A data communications network with remote terminals tying into a central CPU via telephone lines.
- A distributed DP operation in which remote equipment could range from a single terminal to a complex of minicomputer systems communicating with each other and a central mainframe over long distances.

Time-sharing service bureaus, the first category, usually supply basic software for commonly used applications as a less expensive alternative to purchasing an entire system. Since the software is supplied by the bureau's computer, a dumb terminal at the user facility is sufficient if it is compatible with the system's software.

The CPU is on-site in most single-user minicomputer systems. A dumb terminal will probably meet the user's needs, but this depends on the applications because, for example, no dumb terminal has blinking or transmits in block mode.

Multiuser System

A variety of terminal types might be appropriate for a multiuser system that uses several terminals at one location. That decision hinges on the number of people who will be using the terminals at the same time and for what applications.

If many people are going to be on the computer simultaneously, then block mode typically available on smart terminals is desirable.

Communications lines become yet another criterion for terminals in a data communications network. A dumb terminal will not function in all polling networks. Neither will a smart terminal. Therefore, the user may need a network of intelligent terminals based solely on communications protocols.

Finally, distributed data processing involves consideration of several factors including communications and the amount of data that is being processed at remote sites. A large branch office may warrant an entire remote minicomputer system. In that case, a dumb terminal will probably be best as its console.

A branch office with limited processing needs, however, can have an intelligent terminal as the sole piece of equipment. That terminal can perform the essential DP tasks.

User Experience

Next on the list of selection criteria is the experience of the users. How many of the people operating the terminal are familiar with computer equipment and how many are new to it? Is working at the terminal the operator's main function or will it be a secondary job?

The terminal selected should be an asset to the employees, rather than a hindrance. For example, a dumb terminal would be better suited to a business manager who doesn't want to spend a great deal of time at the terminal and wants immediate answers from it.

On the other hand, a programmer who is creating a Cobol program would most likely prefer a smart or intelligent terminal which offers more capabilities.

Beyond applications, user experience and system size comes the ever-present budget. As a rule, it should be as flexible as possible.

Long range needs should also be considered to avoid building obsolescence into a system just to save money at the outset. The user will pay a lot more later to purchase a second terminal, replacing the one that is no longer efficient.

Reliable Vendor

Finally, the prospective buyer should be certain to select a reliable manufacturer. It is critical to study both the manufacturer being considered and its products.

For example, what is the firm's reputation? What kind of customer support does the company offer? How long has the product been in the fields? How many have been shipped? What is the warranty arrangement?

The answers can be found by talking to current users of the equipment, studying the literature and interviewing sales people.

The DP manager who is able to complete this succession of tasks should first be congratulated. Second, he should be in a good position to make the best possible decision for the organization.

Shires is marketing and sales vice-president for Lear Siegler, Inc.'s Data Products Division in Anaheim, Calif.

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Smart, Dumb or In Between?

Highly Functional, Prepackaged Dumb Terminals

By Jack Gostl
Special to CW

The generally agreed-upon line of distinction between smart and dumb has to do with the terminal's ability to be programmed by the user.

If the user can program the terminal, it's smart. If the user can't program or change the terminal, it's dumb.

But that leaves an enormous gray area populated by highly functional so-called dumb terminals that can store data, do simple data validation such as numerical checking and, in some cases, even search and locate functions. The distinction is that these functions come prepackaged and the user has to take them as they are, as opposed to customizing the functions to the terminal to fit particular needs.

From the user's point of view, the question is not only which terminal is appropriate for his needs, but also whether the purchase of a smart terminal is an appropriate expenditure if a dumb one can answer 95% of his needs.

The advantages of intelligent terminals are typical of those of any distributed system. The main advantage is user programmability. The intelligent terminal also offers local storage capability, the ability to pre-edit and reformat data before forwarding it to a CPU and local rejection of erroneous transactions.

'From the user's point of view, the question is not only which terminal is appropriate for his needs, but also whether the purchase of a smart terminal is an appropriate expenditure if a dumb one can answer 95% of his needs.'

And by reducing the load on the host processor, the intelligent terminal can offer considerable line cost savings.

The dumb terminal, on the other hand, is usually much less expensive ($800 to $2,000 as opposed to $4,000 and up for an intelligent device). A dumb terminal is also simpler and more reliable than an intelligent terminal but may be limited to standard protocols and not adaptable to particular or changing user needs.

Intelligent Solutions

One problem solved by an intelligent terminal relates to the cost and time factors involved in moving data back and forth over communications lines. The more data moved, the higher the cost both in dollars and response time.

The intelligent terminal reduces the amount of communications needed between the terminal and the host, while also reducing the overall load on the host by assuming some processing burden.

Let's consider the typical intelligent terminal and how it contributes toward the solution of these problems. First, it has a significant amount of memory. It can hold anywhere from a few thousand to a few hundred thousand characters — certainly more than enough to allow the operator to continue keying when the CPU has to play "catch up."

Second, the terminal is programmable with respect to communications protocols. Finally, since the terminal is programmable, it can contribute significantly to data editing and validation, thereby reducing the number of incorrect transmissions and improving feedback to the terminal operator.

In each instance, a contribution is made to the more efficient function of the host processor without any increase in the complexity of the application code. Even better, it may be transparent to the application!

For example, an important application of the intelligent terminals is in data collection systems. There, they can improve response time and reduce the computing load of the host processor by doing some processing locally, reducing the number of erroneous transactions sent to the host or by batching transmis-

SPECTRON

In the 1980s, data communications will be characterized by larger, more complex network designs, by higher speed operations, by the use of sophisticated bit-oriented protocols, and by a need for new user tools to manage and optimize the networks' operation. Spectron provided solutions for the 70s with its creation of the DATASCOPE and its industry-leading D-300, D-500 and D-600 DATASCOPE series.

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Gray Area Suits Many Applications

Better Than Smart Terminals for Some Uses

sion so that the host receives data at a more convenient time.

The example of data collection provides some points of comparison between smart and dumb terminals with respect to editing the data before it arrives at the host. Data editing can be broken into three general categories: syntax checking, reasonability checking and extending checking requiring resources outside of the input data.

Many dumb terminals can perform crude syntax checks (such as checking for alphabetics in numeric fields). Smart terminals can do quite a bit more syntax checking and reasonability checking, such as making sure that a start date precedes an ending date.

The amount of extended checking that can be done by an intelligent terminal is quite limited — usually because of data storage limitations at the terminal. Performing these checks in the terminal relieves the host of having to perform them and, more important, it keeps many invalid transactions out of the host.

Invalid transactions can cause many problems. In an on-line system, they can clutter the communications lines and waste the host's resources. In batch systems, the implications on invalid transactions are even worse because they do not come to light immediately and it is necessary to await the next batch until the correct transactions can be entered.

This can be hours or days after the initial entry. In the case of entries involving funds transfer or issuance of some legal instrument, the result could be either financial or legal penalties.

Then why batch data? Because batching gives the terminal operator considerable immunity to systems problems such as host failures or overloads. Batching data allows the terminal operator to enter the data at his convenience, and allows the central processor to accept the data at its convenience, providing advatages of both on-line and batch environments.

Banking Environment

An excellent example of the use of intelligent termials today is in the retail banking environment. In banking, on-line access to a centralized data base is virtually mandatory, yet the failure of a host processor can never be allowed to bring a network to a halt.

By adding some intelligence at the terminal, a magnetic stripe on the passbook and some form of local data storage (cassette, diskette or disk), a savings bank can become virtually immune to host failures. The minimum information needed for most transactions is the account number and previous balance.

Given that the magnetic stripe data is consistent with the printed data and that some form of local journaling is available, operations can continue normally. When the host is available, the same intelligence can reduce teller keystrokes, perform local validation and so forth.

As Emulation Devices

Another useful function of intelligent terminals is to facilitate communications between hardware with different or incompatible standards. These problems are more difficult to illustrate since they are not as clear-cut as data collection problems. However, in most such cases, there is some form of emulation required on the part of the terminal.

Consider the problem of any corporation with international offices. These corporations are often caught between the proliferation of equipment using the old asynchronous teletypewriter technology abroad and the newer synchronous technologies at home.

This produces all sorts of problems since the asynchronous equipment may run as slowly as 2.5 char./sec (compared with 4,800 bit/sec synchronous lines running at 600 char./sec) and use unfamiliar character formats and codes.

Many companies have

(Continued on SR/6)

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Commentaries Welcome On Terminal Issues

Controversies seem to lurk on the pages of this report. The reader will find, for example, conflicting definitions of what constitutes a "dumb" terminal or a "smart" vs. an "intelligent" terminal. Observations on where terminal technology is going and on approaches to implementing this technology may also provoke some dissension.

If you want to react to any article in this report, please send a written commentary (absolutely no longer than 100 typed lines) to Brad Schultz at *Computerworld*, 375 Cochituate Rd., Framingham, Mass. 01701.

Such essays will be considered for publication in CW's regular communications section, subject to editing.

How Much Intelligence Needed?: Six Rules of Thumb to Consider

By Jack Gostl

Special to CW

For the user who is still uncertain as to which terminal will suit his needs, here are some general criteria to consider:

- If there is no simple function that can be removed from the host (for example, all validation requires file lookup) there is little point in considering a smart terminal.
- If there is simple data validation that can be performed outside the host, significantly improving the efficiency of the system both in terms of cost and response time, an intelligent terminal may be suitable.
- If the requirements are very simple, such as simple batching of data or minor editing, a slightly more intelligent dumb terminal is likely to suffice.
- If the problem can be addressed by a better communications protocol, such as a bisynchronous protocol, the slightly intelligent terminal may also be a good solution.
- If there are no off-the-shelf solutions despite the fact that your problem is simple (for example, two computers talk the same protocol, but each insists on being the master), an intelligent terminal may be your answer.
- Before committing yourself to a solution, be certain to assess your requirements carefully, consider the alternatives and make every effort to obtain advice from experts in the field.

Gray Area Suits Many

(Continued from SR/5)

turned to intelligent terminals to provide the benefits of modern technology without obsoleting large networks already in place. Or even worse, there are parts of the world where the old technology is all that exists.

The intelligent terminal as an emulation device plays a valuable role in these applications since it may either provide a service that could not otherwise be provided, or it may protect the corporation from a wholesale obsolescence of existing terminals.

Yet all these marvelous enhancements on the functionality of the basic terminal may be useless unless they're really needed by the user.

On one end of the scale are the very intelligent terminals described earlier. On the other end is the dumb terminal, which in its simplest form is no more than a CRT and a keyboard — a communications device between the operator and the central processor.

In the middle — the gray area we discussed earlier — are some very smart dumb terminals which may very well be the best choice for many applications.

Gostl is senior vice-president of New York-based Conversational Systems Corp.

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Small Systems Latest Step in Terminal Evolution

By D.W. Davies,
D.L.A. Barber,
W.L. Price and
C.M. Solomonides
Special to CW

There are two basic kinds of information flow common in controlling terminals.

First, there is the exchange of characters that occurs between a simple terminal and the intelligence governing its behavior. Second, there is the exchange of messages that takes place between the terminal-governing intelligence and the user's applications programs (see Figure 1).

This article will attempt to put the topic of terminal control in perspective by tracing the evolution of computer technology that has led to the distribution of intelligence and storage among the geographically separated components comprising today's complex data networks.

In the early days of computers, the input and output of information was achieved by primitive electromechanical card and tape readers and punches. These were called peripheral devices (or simply peripherals) and were matched to the computer by dedicated electronic and electromechanical circuits.

It was a fairly short step to associate the specialized circuitry needed for a particular kind of peripheral with the peripheral itself so that the connection method used between the computer and the peripheral device could be standardized.

This gave rise to the concept of the standard communications interface, which is a set of connections and signals that are the same, regardless of the peripheral attached to it (see Figure 2).

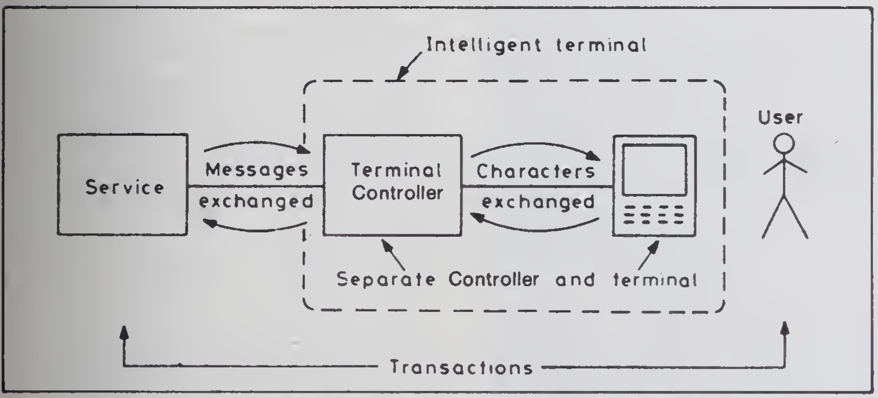

Figure 1. Levels of Information Exchange in Terminal Controlling (Handling, UK)

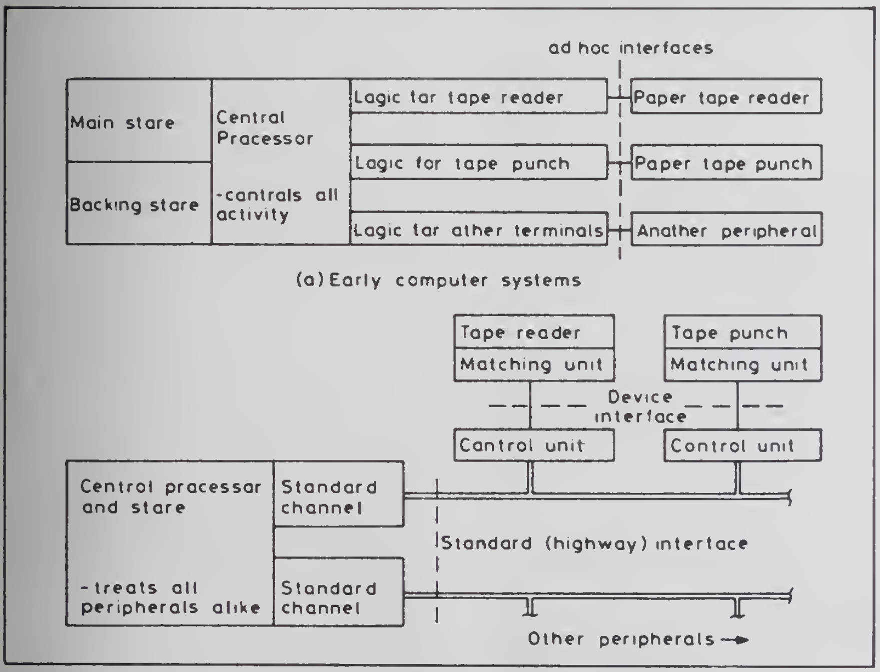

Figure 2. The early development of peripheral controlling is illustrated above. At the top, an early system is shown with separate logic tailored for each device, controlled by the central processor. At the bottom, a later arrangement has the processor controlling standard channels that connect to a variety of devices in a uniform manner.

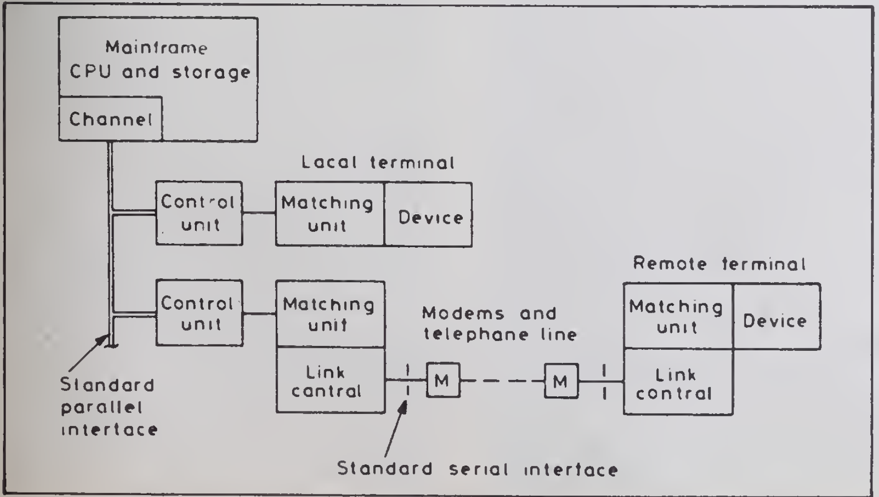

Figure 3. Separation of System Components by Standard Interfaces

The emergence of stand-alone peripherals and standard interfaces made it possible for devices designed for one computer system to work with another computer system. This allowed the compatible range of computers handling a complementary range of peripherals to become a selling point with many manufacturers.

> *'Essentially, it is the intelligence associated with the terminals that is able to disguise different terminals' peculiarities, so that the terminals all appear similar to a remote system or to each other.'*

Some users saw the advantage of using peripherals from one supplier with computers provided by another, but generally the differences in the "standard" interfaces offered by different manufacturers were too great for this to be possible.

For one manufacturer, however, the existence of the stand-alone peripheral led to the possibility of separating the peripheral and the computer (see Figure 3). This allowed the emergence of the private data network — a number of geographically separated peripherals all connected to a common centralized computer system.

It was at this stage that the name "peripheral" began to give way to "terminal."

Terminal Clusters

Whatever the type of terminal, it became common to connect clusters of terminals to a terminal controller, which was itself connected by a leased telephone line to the host computer system. The initial justification for this was economic in that the single leased line was cheaper than separate lines from each terminal to the computer.

By basing the terminal controller on a small computer, other advantages were obtained, such as the ability to edit information by interaction between the terminal and the terminal controller. The latter capability allowed the user to change the content of messages before commanding the controller to forward them to the remote CPU.

The terminal controller's degree of autonomy increased as the power of small computers developed. In some applications, it became possible for quite complex tasks to be carried out by the terminal controller with only occasional reference to the central computer.

Even so, the whole system of distributed terminal controllers and terminals was governed by the main computer. Hence, a master and slave relationship effectively existed between the host system and the private network's dispersed components.

This article and the article beginning on Page SR/8 are adapted from a chapter of Computer Networks and Their Protocols *(1979) by Davies, Barber, Price and Solomonides with permission of John Wiley and Sons, Ltd., Baffins Lane, Chichester, Sussex, UK; and John Wiley and Sons, Inc., 605 Third Ave., New York, N.Y. 10016.*

Advent of Intelligence

It has become common to associate intelligence and storage with simple terminals so that they may be controlled remotely in a more efficient manner than their basic design would allow.

For example, a group of teletypewriters that communicate by the exchange of serial characters in start-stop mode are commonly connected to a terminal controller, which exchanges characters with each teletypewriter

(Continued on SR/16)

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Interactive Terminal Colors User's View of Net

By D.W Davies,
D.L.A Barber,
W.L. Price and
C.M. Solomonides
Special to CW

The interactive terminal is possibly the most important part of any computer network or computer system, for it is the medium through which the user communicates with the services offered to him.

The user's view of these services is bound to be colored by the type of terminal he is using and the way in which it aids or constrains his actions. The introduction of a network between a terminal and a computer system will place additional constraints on the user, compared with a direct connection; yet the network can offer freedom of choice between many services and so makes the ownership of a terminal potentially much more valuable.

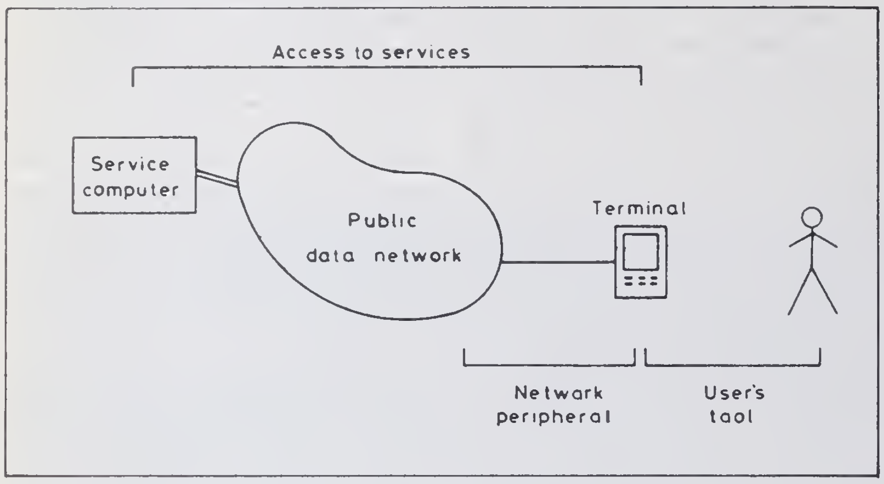

Figure 1. The Roles of a Terminal

This is particularly so with a public network that is expected to support a wide range of new services eventually. However, some very difficult problems arise with an "open system" — where any type of terminal is required to operate with any service — because of the wide variety of terminal types needing support both by the network and the attached service computers.

These problems fall into three main areas that correspond with the three major roles a terminal must perform (see Figure 1).

First, the terminal serves as a peripheral device to the network and may take part in a dialogue with the user to establish calls. Second, the terminal performs its traditional role of acting as the intermediary in the dialogue between a remote computer system and its users.

But most important from the user's standpoint, the third role of a terminal is that of a tool which helps or hinders the user's interaction with the outside world.

The properties required of a terminal in its role as a peripheral to a particular network depend on how it is connected to that network. With the telephone network, a terminal is generally joined to a modem associated with a telephone instrument, which is used to make the call in the usual manner.

'To serve as a tool of the user, today's terminals are generally rather inadequate. All terminals place considerable constraints on people, who usually have to adapt their normal behavior to a remarkable extent.'

A different arrangement is possible with new data networks where terminals can be connected directly to the data circuit terminating equipment (DCE). This allows two possibilities for the interaction needed with the network to establish calls, release calls and so forth.

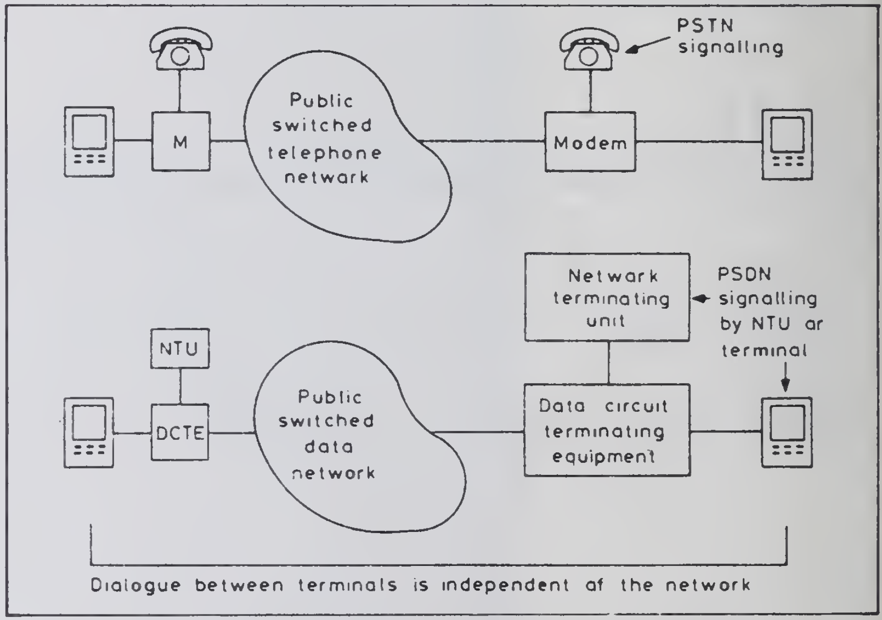
PSTN signalling
M
Public switched telephone network
Modem
Network terminating unit
PSDN signalling by NTU or terminal
NTU
DCTE
Public switched data network
Data circuit terminating equipment
Dialogue between terminals is independent of the network

Figure 2. Possible Forms of Connection of Networks

They are shown in the lower part of Figure 2. Either a special unit is provided, sometimes called a network terminating unit (NTU), or the signaling is done by the terminal itself.

The form to be taken by an NTU for the new public networks or, indeed, whether one is necessary at all, has not yet been established. Some of the research networks have devised their own arrangements, but there is no proposal at the international level that would promote uniformity between different national data networks.

One view is that an NTU would incorporate features similar to the telephone instrument and would be a separate device able to establish and clear calls and provide whatever signals may be necessary for the proper maintenance and operation of the network. On the other hand, there is a potential saving to be gained by incorporating the NTU within a terminal and this could well be a likely future development.

(Continued on SR/26)

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Dumb Terminals Tip Racehorse Buyers, Trainers

LEXINGTON, Ky. — Done correctly, racehorse buying requires a lot of accurate information. A research firm here in the heart of thoroughbred country has chosen a variety of nonintelligent data communications terminals to access breeding and racing records on a time-sharing basis.

Bloodstock Research and Statistical Bureau, Inc. conducts a service for 200 breeders, owners and trainers of racehorses. These users call in from all over the U.S. and, on dumb terminals, access the firm's on-line data base.

"We offer a series of on-demand statistical reports as well as compilations of a horse's complete racing record," R.L. Murray, Bloodstock Research DP manager explained. Either Texas Instruments, Inc. or Digital Equipment Corp. asynchronous terminals are used to access a DEC PDP-11/70 time-sharing minicomputer.

The DEC system until recently had 192K bytes of main memory and used one of its three 176M-byte disks for the racehorse service. The CPU was upgraded last month to 1M byte of storage.

"The typical user does most of his computing just before a major auction," Murray said. "Once a selection of horses is made, the computer is queried for any or all reports about each horse, or the sire or dam of that horse. Many times, the user is at a horse auction, operating the terminal via a phone in a hotel room."

The data base is updated each week because racing results can change the value of the horses overnight. "If a horse wins a $100,000 stakes, the value of the sire or dam goes up," Murray explained.

Choice of Terminals

The company's 200 customers are supplied with TI 745, DEC LA-34, LA-36, LA-120, VT-52 and VT-100 terminals by Qwikterm, a division of Selecterm, Inc. The terminals were picked for three reasons.

The first of these, Murray said, is that "there is no sense in getting an intelligent terminal just to use our services. Such terminals are much faster than the 300 bit/sec communications speed we use, and a buffer is not necessary."

The second reason, Murray continued, is because users work with the DEC system only on an inquiry basis. There is no real need to store the information and no need at all for programming capability.

Third, both terminal manufacturers maintain well-oiled service organizations across the country. "Obviously, some locations are without service offices, but these two firms are the best we have found," he added.

Bloodstock Research had considered acting as an OEM for its customers, but found the proposition unrewarding both because it could not buy in sufficient quantities to get a good price and because it was not equipped to handle inventory and delivery.

"We are primarily in the business of providing information on thoroughbreds, and we didn't want to get into the terminal business.

"By using an outside terminal distributor, we attempted to provide the customer with a choice of terminals, as well as basic time-sharing services," he added.

Available Reports

A user can contact the research operation to acquire information on a horse that is to be sold. Once connected to the DEC system, the user selects one of a variety of reports by using a three-number code and then typing in the horse's name.

The simplest report prints the horse's race record, but the user can ask for family trees for either the sire or dam or for other more lengthy reports.

The race record displays each year of racing, the number of starts, wins, places and shows, as well as the amount of money won, Murray continued.

One report shows the number of wins for a horse, at what ages it was a winner (and not a winner) and total amount won. Another report indicates the consistency of the racehorse and its class, with an index of 1.00 meaning the horse was an average performer.

The sire summary shows the number of foals a horse has sired, as well as the number of winners, starters, earnings per horse and so on. The report on the previous week's stakes races is always popular, Murray said.

When an owner, breeder or trainer has received all or any of these reports, he has a better idea of how to make a buying or selling decision.

In addition to the terminal system it started in 1973, Bloodstock Research performs other services. All the state racing commissions in the U.S. have access to the company's listing of riders, trainers and owners. A horse-buying and -selling operation exists in another part of the company. The firm carries on statistical research by manipulating its data base, and has an interest in breeding, too.

Still 'A Horse Race'

Computers cannot help buyers or sellers of horses predict what an untried horse will be like when or if it

(Continued on SR/17)

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What Qualities Make the Perfect Terminal?

(Continued from SR/2)

usually accomplished by programming the host CPU or by modifying the routines initiated by the terminal's function keys.

On the other hand, a *smart* terminal supports a special-purpose language the vendor has developed specifically for the terminal. The primary difference between smart and clever terminals is that the former provide the user with some amount of random-access memory (RAM) for programming, whereas, the clever terminal typically supports read-only memory (ROM) and is most often applied to such tasks as query and editing of data bases.

Bright terminals are at the high end of the intelligent terminal class. Configured with RAMs and supporting high level and/or assembler languages, bright terminals offer quite extensive flexibility. Some manufacturers have developed software packages and peripherals for bright terminals and market them as entry-level business systems or word processors.

Basic Choice

In essence, the choice between an intelligent terminal and a dumb terminal derives form the user's ability and desire to work on data and from the capabilities of the host CPU.

An executive who uses a terminal to gather important information, for example, usually does not want to do any manipulations of that data. For this person, a dumb terminal will be sufficient.

But a market analyst, as another example, may need to manipulate raw data and reshape it to establish an interpretation. This sort of professional would require an intelligent terminal with some programming capabilities.

Sometimes it is mistakenly assumed that the added flexibility of intelligent terminals offsets their higher cost. Excess intelligence, however, is wasted money; these terminals may no be suited to the tasks they are supposed to perform.

Process of Selection

The relative low cost of terminals (as compared with mainframes and other major elements of a fair-sized DP facility) has led some users to take shortcuts in the procurement process. This is unfortunate because, as stated previously, few DP purchases loom as important to the user as the purchase of a terminal.

Not many companies would purchase a computer system without first analyzing their needs — projecting at least five years into the future — along with identifying the tasks to be computerized. This same process should be applied to the selection of a terminal.

Five steps comprise the selection process:

- Developing the general plan of procurement.
- Documenting technical requirements in detail.
- Surveying the available equipment.
- Soliciting data from a restricted number of vendors.
- Scheduling vendor product demonstrations.

Procurement plan development requires consultation with those who will actually use the terminals. Such feedback gives the company insight into the tasks and procedures the terminal will affect. Limitations of cost and system compatibility are also considered at this point.

Once the general plan is completed, it is important to document detailed technical requirements, which should be expressed in a checklist format and should cover all necessary specifications from screen size and communications capabilities to the terminal's physical size. Some categories to be included in this checklist are:

- *Communications.* Mode of operation (whether simplex, half- or full-duplex); interface requirements (RS-232C, parallel); line speeds; and error detection and correction facilities.
- *Keyboard.* Character set; number of characters; upper/lower case requirements; keyboard detachability; function keys; numeric pad.
- *Display.* Screen size; number and size of characters; number of display lines; split screen capability; highlighting; scrolling; blinking; character and line insertion and deletion; tabbing; underlining; and inverse video.

The number of possible vendors can be limited to five with such a checklist, which can be used in conjunction with information available from research-oriented service and consulting firms, user groups and other users that have bought similar equipment.

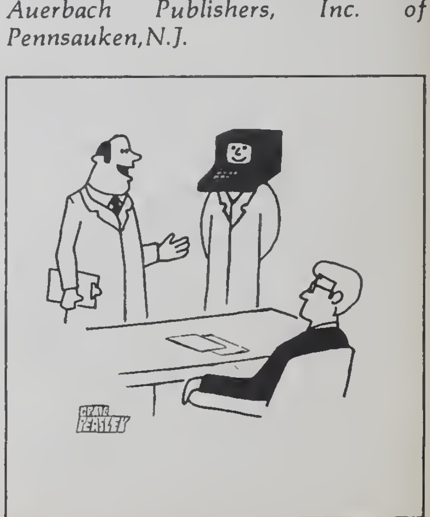
These five vendors should then be contacted and asked for written descriptions and current prices of their products. In dealing with representatives from these manufacturers, it is important to grade their responsiveness, which may reflect the service you will receive once the equipment is delivered.

An effort should also be made to determine each vendor's maintenance policies, support programs and training programs.

The next stage of the procurement process is demonstration of the terminals under consideration. If possible, these demonstrations should be held at the site where the terminal will be used. Those who will use the terminal should be invited to participate in the demonstrations and to ask questions of the vendor representative.

Finally comes the time to decide what terminal will be ordered and whether it will be purchased, rented or leased. Installation dates should not conflict with peak business periods (such as the end of a fiscal quarter). The purchaser should insist on a detailed, specific contract that includes all promises made by the vendor representative during the course of preliminary negotiations.

Williams is a product manager with Auerbach Publishers, Inc. of Pennsauken, N.J.



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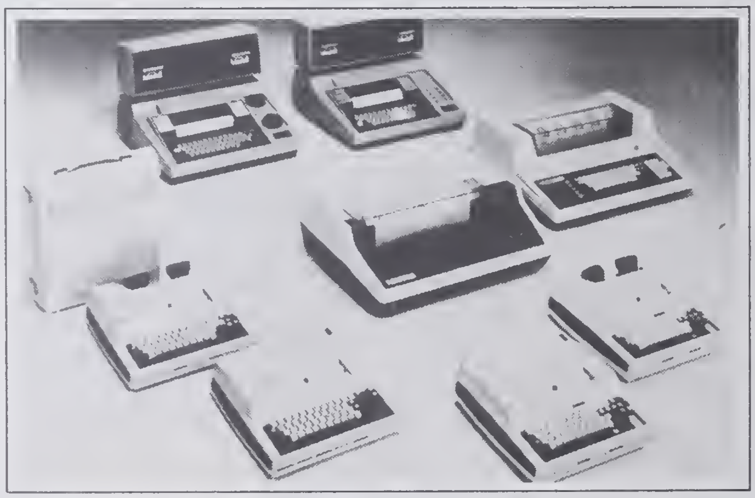

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Structured Programming a 'Godsend'

Smart Technical Writer Picks Dumb Terminal

By Nancy Scott Damren
Special to CW

As a technical writer, my perspective on the question of intelligent vs. dumb terminals is somewhat different from that of other DP professionals. A terminal is a tool I can do without in my job and in fact, I do not currently use one. This is not to say that I do not like to use a terminal. I do. But the terminal cannot be regarded as separate from its accompanying system and software if it is to be used successfully.

As a very junior programmer in the mid-1970s, I was brought up on the "Kiss" rule of programming — "Keep It Simple, Stupid!" The idea behind the Kiss rule is that the program or system should be easy to use and maintain.

Terminals need no frills to be powerful tools in technical writing, the author maintains. On-line text-editing software — accessed via terminals — can reduce the man-hours needed to produce the literature that helps users understand the resources they buy or develop.

Therefore, I regard structured programming as a godsend and view a terminal that emulates a typewriter, but connects to a computer system with powerful software, as God's gift to the writer. The perfect terminal for me is a CRT device that links to a time-sharing system. The host CPU's operating system should be simple to learn, logically presented and versatile enough to let me combine files, split files, operate on large strings (at least 5,000 char.) and move differently sized chunks of files around among other files or within one file.

The editor module should be a string processor with a large number of temporary buffers that will permit me to combine files; move back and forth by lines or characters within the current buffer; delete lines, characters or even pages with simple mnemonic commands; and build strings of commands for later execution. This requires some measure of programming capability within the editor itself.

I find that work proceeds more easily if the formatter is not part of the editor. When writing, I do not need to look at the finished product to see whether a format is being followed correctly. The file under consideration can always be passed through the formatter at a later time to determine whether my work has adhered to a specific structure.

The editor that appeals to me permits the following:

- Strong operations on strings of more than 5,000 characters.
- Verification of operations either automatically or on request only.
- Global changes within a file.
- Construction and execution of command strings, including iterations and conditionals.
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I need an editor that has mnemonic commands and emulates a typewriter. It should set tab stops within a single command, set and reset either margin with a single command, set page size with a single command, accept lowercase data without transforming it to upper case and make nested lists, cautionary notes, tables and literals.

Function keys are not necessary for my purposes. The point of the whole exercise is to write, not play with bells and whistles.

Because most of the action occurs in the software and very little happens in the hardware, there is no need for a complicated terminal. I therefore favor dumb terminals — CRT units with typewriter-style keyboards and not much more.

Damren is a technical writer for The Computer Software Co. and lives in Richmond, Va.

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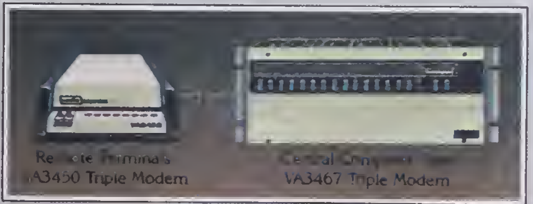

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TEXAS INSTRUMENTS

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Course of Terminal Products 'Fixed' for 1980s

(Continued from SR/2)

in a homogeneous fashion.

This lends itself to a fixed-function terminal that is multitasking, multifunctional and remote batch. Multitasking characteristics separate the operator from the communications processing requirement in real time.

Multiprotocol or multifunctional capabilities provide compatibility with multiple communication networks via software or firmware upgrades, or those features provide multiple port interfaces to communication facilities.

Communications and host processor savings can be achieved by batching on dial-up facilities or by buffering on dedicated resources, since that permits the highest level of system throughput.

Each of the fixed-function terminal capabilities is limited only by one's imagination and the ability to define and implement what the ultimate user of the fixed function terminal desires.

Operator/machine functionality can consist of text editing or word processing facilities, intelligent data entry formatting, electronic mail, industrial graphics, typesetting input and so on.

Local data manipulation in either on-line or off-line modes could provide interpretive debugging on routines for the programmer, data validation for order entry applications and even inventory or accounts receivable routines serving the small business user.

The communication network compatibility of fixed-function terminals permits the user to interface the external world on a terminal-to-terminal, terminal-to-host or terminal-to-service bureau basis.

The important aspects of the communications interface are:

- Flexibility that proliferates a rental base of terminals through standardized hardware.
- Compatibility that supports the varied communications protocols in use today and in the future.
- Support for local and remote diagnostic techniques to render quick resolution of communications problems.

The goal of the next generation of communications-oriented terminal products should be simplicity. A fixed-function terminal should aid an operator in performing the work required at a remote site. To do this, functionality must be easily understood, recalled and explained with a minimal level of training.

Moreover, the sophisticated functionality encompassed by the local intelligence to handle data validation, file manipulation, error checking, hardware-dependent tasks and elaborate protocol interfaces to the network must be transparent to the operator.

By necessity, the terminal must be engineered for people independent of their formal or informal educational background. The responsibility for this task rests with the marketing and engineering groups that specify and implement market-required functionality.

Clearly, substantial improvement can be achieved in the operation of data communications terminals. Editing commands can be readily accessed via console key and their respective actions can be well understood. Positive feedback can be given to the operator through prompting messages upon task completion, decision points or verification of commands that result in data deletion.

Buffers can be organized into easily identified data files or messages supported through directory listing and the utilities required to manipulate those text or data files. And resident data can be identified as to its function — whether it is transmission, received information or locally resident data.

Data Integrity

The proliferation of fixed-function terminals will lead to increased application of the more powerful communications protocols to ensure data integrity while maintaining system throughput or response.

No longer will the manufacturer, terminal and protocol be bundled into an inseparable package. Instead, the system engineer will be able to select the best combinations of remote terminal, transmission facilities, protocols and communication controller to suit the network application and deliver the results desired.

Words of Caution

However, several cautionary points should be made about the spread of fixed functionality. Terminals containing integral computing capability for remote applications will be much constrained by vendors to fit the capabilities of supporting, application-oriented products. Care should therefore be taken in selecting vendors whose products have demonstrated market staying power and strong customer support.

Moreover, the most cost-effective fixed-function terminal products will incorporate application and communication functionality in removable cartridges or chips that reside in read-only memory.

Care should be taken in both evaluating and selecting compatible network terminals. Mistakes made in a hastily done compatibility assessment could result in substantial network customization needs later on.

Montemerlo is Digital Equipment Corp.'s manager for fixed-function terminal products. A part of DEC's Terminal Products Line facility in Marlboro, Mass., his group designs "smart" terminal functionality.

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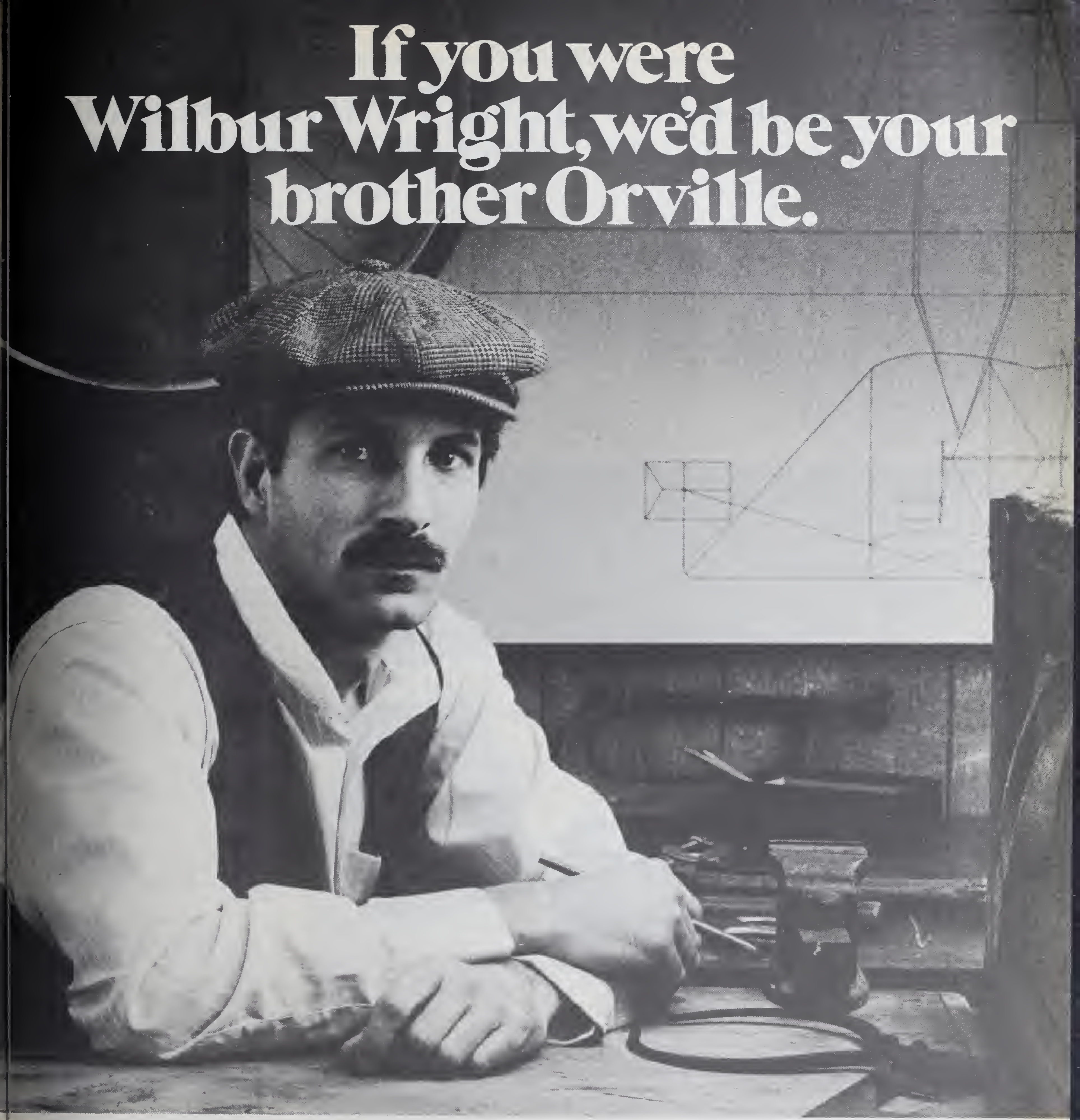

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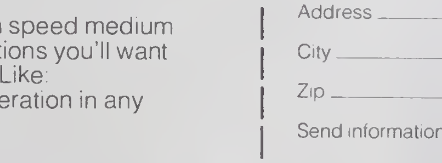

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Small Systems Latest Step in Terminal Evolution

(Continued from SR/7)

just as a mainframe handled peripherals in earlier forms of data networks.

Thus, the terminal controller takes over the low-level task of character handling and acts as an agent for the mainframe. Messages are passed between the mainframe and terminal controller to administer the latter's behavior according to the requirements of applications programs run by the mainframe.

Interaction Between Terminals

The separation of the task of terminal controlling into the two levels mentioned at the outset of this article paves the way for standardization, which allows some degree of freedom in the ineraction between different types of terminals.

Essentially, it is the intelligence associated with the terminal that is able to disguise different terminals' peculiarities, so that the terminals may all appear similar to a remote system or to each other.

This principle is the same whether the intelligence is associated with a cluster of terminals in the form of a terminal controller or associated with one particular terminal in the shape of an intelligent device.

This is illustrated in Figure 1 by the dotted line surrounding the terminal and its controller.

Advent of Micro

The advent of the microprocessor will accelerate the proliferation in intelligent terminals, so we can expect to see more and more communication between intelligent devices and a decreasing need for networks to carry character traffic.

However, there is a considerable investment in existing systems at various stages along the path of evolution, and so various ad hoc modifications will be needed if systems are to be made to communicate in ways that are less terminal-dependent.

Furthermore, there seem to be some situations where a strong coupling exists between the application and the detailed manner in which the terminal is required to behave. This creates problems when defining standards for communication between the higher levels of intelligence.

In discussing terminal controlling, therefore, there are three basic considerations:

- The way in which the terminal controller's intelligence interacts with the terminal itself.
- The way in which the terminal controller's intelligence interacts with a remote computer or another terminal controller.
- The degree to which these two levels of interaction can be made independent.

Character Echoing

As an example of terminal control, we will consider the use of character echoing techniques. The connection between the terminal and the terminal controller can be either full-duplex or half-duplex.

With a full-duplex connection, the terminal controller and the terminal may each independently send characters to the other, and the terminal does not display or print locally the transmitted character.

With a half-duplex connection, the terminal and the terminal controller cannot simultaneously send each other characters, and the terminal prints locally each character as it transmits that character to the terminal controller.

The half-duplex arrangement has the advantage that a person using a terminal can see exactly what he has typed, as it is typed, but he does not know whether the transmitted character was corrupted on its journey to the terminal controller.

With a full duplex-connection, the characters are not seen as they are typed, but may be transmitted back to the terminal by the terminal controller to verify that they were correctly received.

Generally, the latter happens so quickly that the user has the illusion of employing a local half-duplex connection.

'Echoplex' Scheme

The scheme whereby characters are returned to a terminal to provide error control is known as echoing or "echoplex."

When a terminal operating in the half-duplex mode is used with an echoing terminal controller, each character is printed in duplicate: first from the local echo at the terminal, and then from the terminal controller's echo.

On the face of it, a simple initial dialogue would allow a user to set up the echoing mechanism. But sometimes it is necessary to be able to inhibit character echoing selectively. This is needed, for example, during the input of confidential information, such as a password, so that it is not printed or displayed on the terminal.

In light of this example, it seems that present-day systems can require a close coupling between terminal characteristics and the behavior of the host computer's applications software. The key to open working, however, is to reduce the coupling to a minimum so that a service may send information to the terminal controller in the form of a file of characters.

Davies, Price and Solomonides are affiliated with the UK's National Physical Laboratory in Teddington, England. Barber is director of the European Informatics Network.

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Evaluating Machines, Vendors

Checklist Displays Guidelines for CRT Selection

By Bud Bleininger

Special to CW

Planning to buy a CRT terminal? Here are some fundamental guidelines to smooth the selection process.

First, needs should be determined on the basis of these factors:

- Capacity of display (maximum number of characters the screen must be able to hold at one time).
- Flexibility of communication speeds.
- Compatibility with existing or anticipated host computer systems.
- Functions required.
- Price.
- Whether the terminals should stand alone or function in a clustered environment.

Next, the user should decide which of the three broad classes of terminal — dumb, smart or intelligent — is most appropriate to the applications under consideration.

Dumb terminals have the basic capabilities of a teletypewriter, but may replace the latter because they offer faster transmission speeds or can run more quietly.

Smart terminals are usually microprocessor-based, but do not provide user programmability. In general, these terminals feature:

- An editing capability, paging and protected fields.
- An ability to transmit data in block form to the host CPU, which is useful for generating a full screen of information prior to transmission.
- Suitability to environments where variable information is updated onto a protected field.
- A range of transmission speeds and capability for synchronous transmission over a communications link.

Finally, *intelligent* terminals are programmable devices that can be made to fit most user requirements. This third class of terminals is the most flexible of the three from the standpoint of peripheral support. Manufacturers endow these terminals with read-only or random-access memories that are accessible to the operator for development of his own software.

After settling on the class of terminals to be procured, the user should proceed to evaluate the manufacturers that produce terminals of that class. The user should launch a request for formal proposals from the manufacturers.

During vendor selection, the user should try to get an on-line demonstration of the unit or, if that proves impossible, a simulation of the candidate terminal on the host computer might be worthwhile. Otherwise the manufacturers' specifications must suffice as the criteria for selection.

Also during the vendor-selection phase, the user should assess whether each manufacturer has a reputation and apparent capacity for delivering and supporting products of high quality. And a price performance analysis should be undertaken to determine the price vs. features trade-off and compatibility of interfaces.

Moreover, the process of selecting a manufacturer should include an investigation of hardware reliability. The user should also ask the prospective seller for references from other customers of the products considered for estimates of mean time between failures (MTBF) and mean time to repair (MTTR) for those products and their major components.

Vendor Support

Vendor selection should include an investigation of post-sales support. For example, the user should identify the locations and response times of service centers on which it might rely as well as what those centers charge for their work.

The vendor selection process should culminate in development of a comparisons matrix — a table summarizing what has been learned about each vendor candidate.

As a variation on the above approach, the user contemplating purchase of at least 50 terminals might make an initial cut of two or three vendors and then enter into negotiations with them on the basis of price vs. technical proposals. The negotiations would lead eventually to giving just one vendor the deal.

Bleininger is peripherals vice-president for Microdata Corp. of Irvine, Calif.

Terminals Aid Horse Buyers

(Continued from SR/9)

races, but Murray said Bloodstock Research does the best it can.

"As thoroughbred development continues to be intensely competitive, successful breeders are finding the computer more useful than ever. Yet in spite of sophisticated and accurate computers, raising champions is still something of a horse race," he observed.

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Checklist Approach: No Way to Buy Terminals

(Continued from SR/2)

functions impossible for a host computer system to perform. Examples of these capabilities include character highlighting features such as blinking, reverse video, underlining, "half-bright" character display and certain security features.

Obviously, a host computer system cannot cause a character to be displayed in reverse video on the screen of a traditional conversational CRT terminal. Such capabilities have become so commonplace they are increasingly being found on "dumb" terminals that lack any other advanced features.

Another related capability found on the more advanced terminals is that of multiple character sets — such as foreign language, graphics and mathematical and editing symbols. Key considerations in choosing a terminal with multiple character set capability are whether the terminal permits the user to do the following:

- Switch character sets from time to time during an application.
- Display different character sets simultaneously, especially in adjoining screen locations.
- Modify and/or create a character set, either through insertion of firmware or by downline loading software from the host system directly into terminal memory.

Using 'Windows'

With the current trend toward distributed data processing, a group of capabilities has evolved to off-load the host system's work load. An important capability of this type is called "windowing."

According to the definition accepted by Human Designed Systems, Inc., a window is a rectangular portion of display memory (though not necessarily displayed) that acts and is treated as a logical subterminal.

Any functional capability applicable to the system as a whole can be applied to a logical subterminal (window). This gives the user important applications flexibility, best illustrated through example.

Consider an application built around a 12-line form on the screen consisting of customer data such as name, address, phone number and so on. The bottom half of the screen displays customer purchases and also occupies 12 lines.

In this example, the application may require the display of all the purchases made by a given customer over the past year (assume 35 lines for this purpose) plus the ability to search and scroll through these purchases. Because only 12 lines can be displayed at a time, some way of scrolling through the remaining 23 lines must be found.

The solution to this application challenge points up one of the differences among dumb, smart and even smarter terminals.

Editing Capabilities

On a traditional conversational (so-called dumb) terminal, the only way of displaying one additional line's worth of data is by rewriting all 12 lines — placing the second line in the first position and so on. On some more capable (smart) terminals, editing capabilities are offered that allow the computer to delete the first line, position the cursor at the 12th line and insert a new line.

This causes all lines to move up until one line moves into the position formerly held by the deleted line.

Note that many terminals claiming to have editing capabilities cannot perform the above sequence. Editing on such terminals can be performed only from the keyboard and not from the host computer. On smarter terminals, however, windows can be used to perform this sequence.

How? Simply define a window of the appropriate 12 lines and enter data in a normal fashion. When a new line is to be added, transmitting a linefeed will cause all lines in the window to move up one position (losing the first line) and allow an immediate entry of the new line.

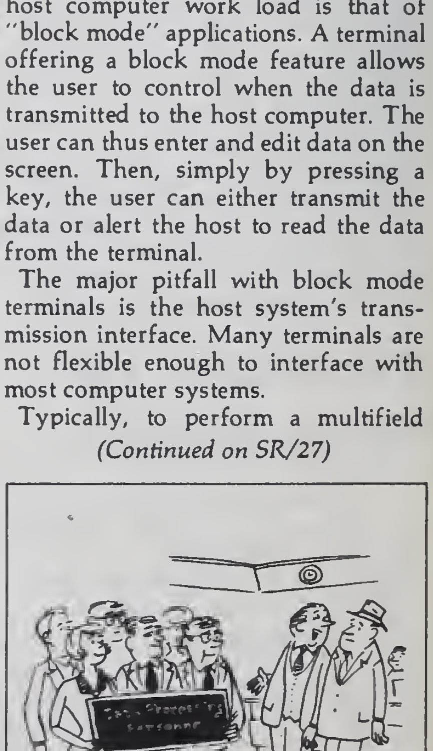
Block Mode Applications

A second example of offloading the host computer work load is that of "block mode" applications. A terminal offering a block mode feature allows the user to control when the data is transmitted to the host computer. The user can thus enter and edit data on the screen. Then, simply by pressing a key, the user can either transmit the data or alert the host to read the data from the terminal.

The major pitfall with block mode terminals is the host system's transmission interface. Many terminals are not flexible enough to interface with most computer systems.

Typically, to perform a multifield

(Continued on SR/27)



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Replace Traditional Slide Show

CRTs Dramatize Selling Software Products

By a CW Staff Writer

WELLESLEY, Mass. — A common software selling tool is the slide projector, but slides cannot match the effectiveness of hands-on product demonstrations on a CRT terminal.

This is what Cullinane Corp. has found after scrapping its traditional slide show in favor of a terminal to demonstrate its interactive software, using a phone to link it to the software house's CPU.

Cullinane is not sure exactly what effect using a remote terminal for on-line demonstrations has had on sales, according to Bill Rabkin, product coordinator for on-line systems. Rabkin is certain, however, that demonstrating a product is easier than merely talking about it.

The proprietary software firm's sales representatives, working out of 10 regional locations in the U.S. and Canada, carry a Digi-Log Systems, Inc. Telecomputer II, a portable Teletype Corp.-compatible terminal with a built-in acoustic modem and a 5-in. CRT.

The Telecomputer II was the only terminal the firm could find that satisfied its demonstration requirements and was small enough to fit under a passenger seat on a plane, according to Rabkin.

Twenty-one of the terminals are now in use, and on any given day as many as eight sales presentations are being given. The capabilities of the terminal make it possible to show one of Cullinane's IBM 370-based software products to groups ranging in size from 10 to a few hundred. "There is nothing like a live demonstration to show the software," he said.

Cullinane's Requirements

The prime requirements for the terminal were that it have a CRT, generate a video signal (to display terminal output on a large-screen projection television or CRT monitor) and be portable, according to Rabkin. After several months, the software house was unable to find a terminal other than the Digi-Log that met all of its specifications.

"We could have used Digi-Log's Microterm keyboard and obtained a CRT monitor. Then you would have to add an acoustic coupler and a foam carrying case. We might have saved a couple of hundred dollars, but the resulting package would have been too large to carry or fit under a seat," Rabkin explained.

When Cullinane offered its first software product in 1970, it used a combination of literature and photographic slide show to augment the sales representative's pitch. But when the firm introduced Interact, an interactive program development package for remote job processing, text editing and word processing, its sales approach came under review.

The software house needed more than a slide show to demonstrate clearly the capabilities of its new packages, so the idea of showing customers the product in real-time on a CRT terminal was hatched. The Digi-Log offered the distinct advantage of generating a video signal to drive large-screen video monitors, an attribute the firm thought would be a useful sales tool, the product coordinator said.

Cullinane acquired a pair of the Telecomputer II terminals as part of a test project to demonstrate Interact. The terminals were linked via phone lines to Cullinane's National Advanced Systems, Inc.'s (formerly Itel Corp.) AS/5 Model 3, a 4M-byte system running under the MVS operating system.

The terminals worked satisfactorily and the company decided to use them for all Interact product demonstrations. The firm had no need for a programmable terminal because the products were meant to be shown on-line with no requirement for stand alone processing facilities on the part of the terminal, Rabkin said.

"We were so enthused with the results of Interact product demonstrations that I strongly

(Continued on SR/22)

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Terminal Intelligence Climbing as Prices Drop

By Jay Woodruff
CW Staff

CRT and teleprinter prices appear to be dropping more slowly than in past years and may eventually bottom out. At the same time, users can look for more features in their "dumb" and programmable terminals.

These and other trends were discussed recently by Linda Drumheller, associate editor, data communications, at Datapro Research Corp. She stressed that Datapro is not a market research group and that her analyses include no crystal ball of the future.

Until a few years ago, terminal prices were dropping as much as 30% a year, assuming that capabilities remained unchanged. Now, the average reduction in price is closer to 10% each year, she said, but both dumb and nonprogrammable terminals are being delivered with more features.

"Over the last year, there has been a trend toward increasing 'intelligence' coupled to decreasing cost. As new terminals have been introduced, we have seen manufacturers add more features or undercut their prices, or sometimes a combination of both," Drumheller said.

For example, Lear Siegler, Inc.'s latest terminals, the ADM 31 and ADM 32, are more capable than the terminals they succeed, but cost less, she noted.

And the price range for comparable terminals is now very wide, she indicated, with some IBM-compatible terminals from manufacturers like Hazeltine Corp. costing about half of the IBM products, in spite of identical performance characteristics.

This puts a firm like IBM, with a big price cushion, in a position to cut prices without losing profitability. However, Drumheller emphasized she has not seen this happen yet.

Product Introductions

In the 18 months she has worked at Datapro as an editor, Drumheller has noticed that vendors, not unlike car makers, are not revamping their entire product line each year, but instead introduce at least one new model each year and often add features to existing models.

This approach allows the vendor to keep up with the market. "By definition, if you stand still, you will be left behind," she said.

And the industry has certainly developed peaks and valleys in its annual product introduction schedule, with the expected peak at the National Computer Conference (NCC) in late spring.

After NCC, product announcements have stayed "pretty active" until late fall, with January and February providing the valley of the cycle. However, the cycle is not as repeatable month by month as is the automobile industry, she added.

Sales Growth

Drumheller said she has read of predictions that there may be no foreseeable limit of how many terminals can be sold. "It seems to me that the only way this could be supported is by finding new applications. It means putting terminals in places that they never have been before — not just in business, but in the home."

New markets will have to be opened to support terminal sales growth, she said, and business is making strong efforts to create them. One of the many new areas ripe for terminal placement is remote processing — putting more DP capability on-site.

This "strong trend" has resulted from the distributed processing and network architecture that is available, and programmable terminals have a place in such a system because of their increased ability to communicate with a host system.

It has become difficult to define what constitutes an intelligent terminal and what

(Continued on SR/22)

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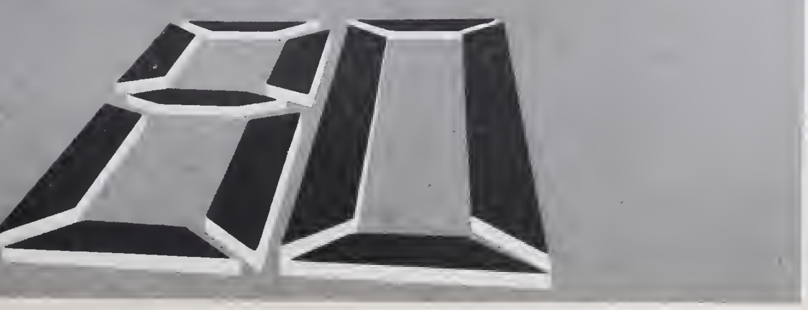

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(Continued from SR/20)

recommended we use the terminals for customer education classes. We find it to be extremely effective anf beneficial to our customers and to Cullinane."

The product coordinator said that hands-on training gives them a better understanding of a package's capabilities and features. Further, they gain a familiarity with the product, he added.

"That is when effective customer training pays off because well-informed customers significantly reduce our efforts and cost for customer service," Rabkin explained.

Other Demonstrations

The software house now uses the terminals to demonstrate other interactive software. A typical group demonstration ranges for 12 to 35 persons, and a large-scale demonstration at management seminars is possible when the Telecomputer II is used to drive Advent Corp.'s 7-ft diagonal projection television.

Using the terminal "makes it easy for us to convince the prospect when he can see the results for himself and also because our sales people can demonstrate our products anywhere," the product coordinator said.

Cullinane uses the Telecomputer II to show products such as IDMS-DC, a data communications version of Cullinane's IDMS data base management system, and On-Line Query, an information retrieval package.

Cullinane's most demonstrable product is Intellect, a front-end package for On-Line Query, which makes for a "dramatic show," according to Rabkin. The product eliminates the need to communicate with a computer in its own language and allows the operator to communicate instead in English.

After seeing a demonstration of how the user can access the data base, the prospective customer can try it himself.

This trial run partially removes the burden of proof of viability from the sales representative's shoulders and allows the customer to prove the product's worth to himself, Rabkin indicated.

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Edited by Jay Woodruff and Tom Henkel, the first half of this Special Report is a consumer guide to OCR and key-to-disk systems. Included will be lists of popular vendors in these data entry fields and a comparison of the packages they offer.

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Intelligence Climbing

(Continued from SR/21)

makes another dumb.

"Certain features may seem to be an increase in intelligence but may just be frosting on the cake," she said. Dumb terminal manufacturers might add new features that used to involve keying in a string of codes, so the computer doesn't have to do it, and call it intelligent. But it is really not."

This is why Datapro refers to terminals either as programmable or nonprogrammable. But however it is defined, Drumheller notes that the last year has brought an overall increase in the amount of terminal functions.

Surprisingly, few vendors of nonprogrammable terminals are introducing programmable models, while programmable terminal makers have made limited forays into nonprogrammable systems. Only a few, like Beehive International, Inc., have lines that overlap the two terminal markets, she said.

Programmable terminals may have contributed to the tendency toward centrally managed computers and satellite centers, and away from the notion of fully decentralized systems, because the programmable terminal can provide on-site data processing, she indicated.

There is also a trend where minicomputer vendors and data entry terminal vendors are now adding communications capabilities to their products. "Nixdorf Computer Corp. and Mohawk Data Sciences Corp. are among the data entry vendors, along with minicomputer vendors such as Datapoint Corp., Digital Equipment Corp. and NCR Corp., who have added communications to allow their use in a network," she continued.

This trend has become sufficiently strong that Datapro will be publishing a new survey scheduled for May that will review the communications capabilities among minicomputer makers — the first such survey that firm has done, Drumheller said.

For Remotely Accessing Large Systems

Communicating Micros Challenging Terminals

By Jay Woodruff
CW Staff

Are communicating microcomputers a strong alternative to the user-programmable terminal?

Yes they are, according to spokesmen for two of the leading micromakers, who told *Computerworld* recently that significant numbers of users are starting to consider the smallest class of computer systems as a means of remotely accessing the largest systems class.

A spokesman for Apple Computers, Inc. of Cupertino, Calif., said that users are coming to realize that for many applications the stand-alone micro has sufficient computing power and flexibility to cause some users to prefer it to less competent and often more expensive programmable terminals.

Toy Connotation

For too long, the term "personal computer" has had a connotation of a toy-like device designed for use in the home, according to Barry Margerum, one of the personal computer maker's product managers.

"Operators of intelligent terminals have to consider Apples, especially from a price point of view. An Apple II, when compatible with line protocols . . . can do everything a programmable terminal does, plus has stand-alone capability," he said.

The product manager also saw a trend toward using micros instead of "dumb" terminals because they can minimize connect time.

"Micros can do on-site processing and can also be used to transfer data. Dumb terminals will always have their place, but price will be a strong factor for considering the micro," Margerum continued.

Uses in Business

Apple microcomputers are sold largely as stand-alone systems for business applications, but it apears there is a trend toward ordering micros with communications capabilities. They now will be used not only to interconnect with other micro users, to access other Apple owners, but also in business situations where a variety of new applications are taking place.

For example, an Apple user can access reports on the 6,000 stocks covered by the Dow Jones Co., then manipulate the information with Apple's Portfolio Evaluator.

"Many of our users are accessing Dow Jones and creating and editing portfolios with this package," Margerum explained.

Micros are also taking their places in terminal networks that might previously have been the province of programmable terminals. Margerum mentioned Nestar Systems, Inc.'s Cluster Share system, where up to 64 Apple micros can work as stand-alone computers while taking advantage of the economies of "sharing, access and communications."

For the price of some nonprogrammable terminals, the Bank of Louisville, headquartered in Louisville, Ky., has outfitted its branches with 55 Apples. They are used both as stand-alone nodes and for those applications requiring connections with the bank's mainframe system.

> *'Micros can do on-site processing and can also be used to transfer data. Dumb terminals will always have their place, but price will be a strong factor for considering the micro.'*

Apple has received requests for additional applications for the Apple II and is aware of others put together by users, Margerum said. He added that the desktop mirocomputer should show by its applications that it is not a toy and has serious possibilities for applications, some of which

(Continued on SR/44)

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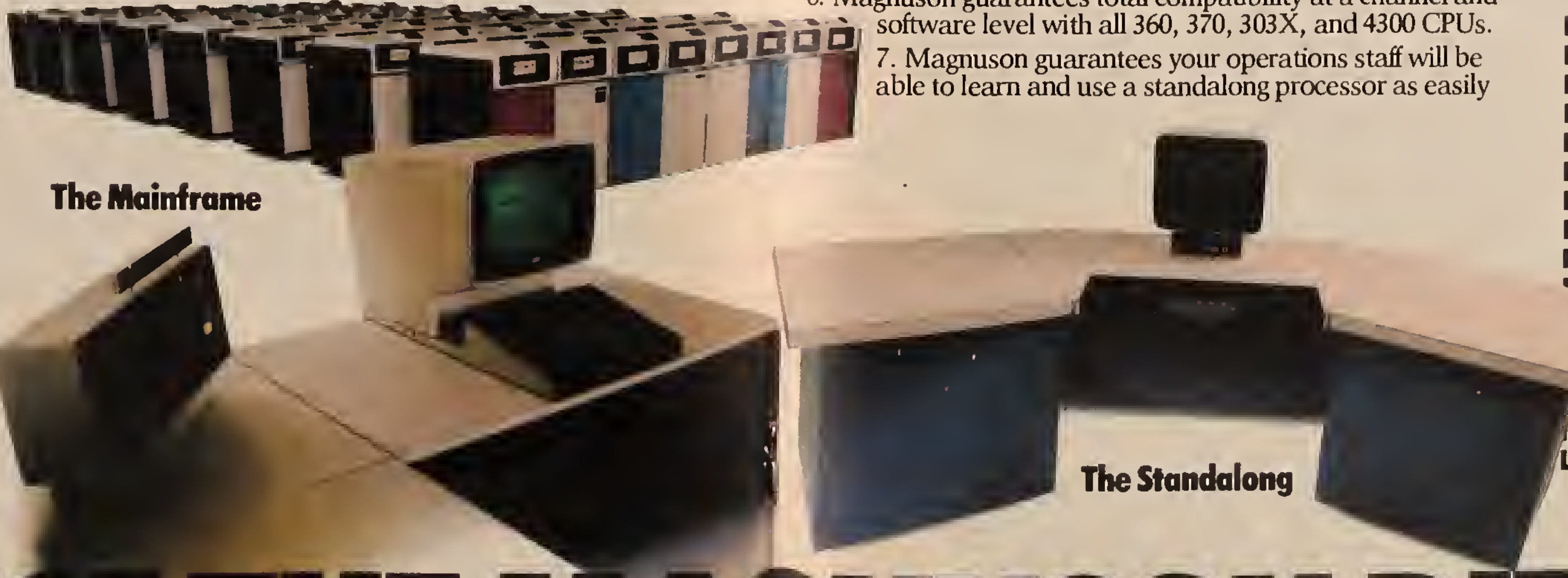

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Interactive Terminal Plays Three Major Roles

(Continued from SR/8)

Most terminals designed for interaction with people are readily able to serve as peripherals to a network for the generation and reception of messages about call establishment and clearing. But it is important to get the interaction with the network clearly defined and separate from the dialogue with other terminals, for most users would not want network control messages mixed with, say, a file of texts being printed from a remote computer.

This suggests that, with some types of terminal, an NTU may be needed to generate and display information about the network. In practice, therefore, an NTU with perhaps a few push buttons and lights seems a desirable feature for a public data network.

Ideally, it should be designed to pass network messages through to any associated terminal that is capable of carrying out a more sophisticated interaction, perhaps to provide a user-friendly command language.

'Ideally, from the point of view of one person communicating with another, it should be possible to transmit and receive information as it might be exchanged, for example, between people writing on pieces of paper with pencils.'

The properties required of a terminal to serve as a means of communicating with a computer system depend of course, on the computer system and the type of application. Some types of terminal may be usable for a variety of applications that pose varying degrees of difficulty. Others may be much less flexible, but are especially suited to certain tasks.

The more general-purpose interactive terminals for text handling are potentially usable with a wide range of services, although this would require widespread agreement on the relevent protocols. Computer-access terminals can be divided roughly into the following three categories:

- First, there are those terminals which present information sequentially with a minimum of structure; for example, the ticker tape giving stock exchange information or the teletypewriter presenting messages as a sequence of characters on successive lines. The latter is often called a scroll mode terminal.
- A second type of text handling terminal is the page mode terminal, which handles information in the form of pages, or frames presented in succession on the screen of a visual display. This kind of terminal can build up information rapidly in an apparently random manner, and this offers some advantages compared with the simpler method of display.

This is because information that is not changed from page to page need not be repeated. Also, the user may interact with the information in page form in ways that are sometimes simpler than interactions possible with a scroll mode terminal.

- The third class of computer-access terminal, the data entry terminal, is an elaboration of the page mode device and allows areas of a screen to be reserved for special purposes. This permits interaction between the user and some parts of the information presented, while prohibiting interactions with other parts of the data structure.

'The truly general-purpose terminal that allows users to communicate effectively with other people as well as with computer systems does not exist, and it may be some time away.'

User's Tool

To serve as a tool of the user, today's terminals are generally rather inadequate. All terminals place considerable constraints on people, who usually have to adapt their normal behavior to a remarkable extent.

Ideally, from the point of view of one person communicating with another, it should be possible to transmit and receive information as it might be exchanged, for example, between people writing on pieces of paper with pencils. Within the simple constraints of the size of paper, any kind of picture or message can be indicated, of any size, in any color and with all kinds of emphasis, where required.

Furthermore, when speech is used to help describe the picture, the information transfer is enhanced significantly, especially when several people may interact in a conference or a committee.

It is true that terminals which transmit the movements of pencils can be associated with a speech channel; and one can send documents using scanning techniques such as a facsimile or TV camera if cost does not matter.

But to use such techniques for interaction with a computer system is not really feasible at the present time. The truly general-purpose terminal that allows users to communicate effectively with other people as well as with computer systems does not exist, and it may be some time away.

Davies, Price and Solomonides are affiliated with the UK's National Physical Laboratory in Teddington, England. Barber is director of the European Informatics Network.

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#102

Checklist Approach: A 'Disastrous Mistake'

(Continued from SR/18)

and line transmit, characters must be used to delineate end of field, end of line and end of message. Some terminals have a fixed character — often a carriage return or "EOT" — that terminates a field, line or message. If, however, the host system cannot handle this character or uses it for other purposes, too bad for the user!

More capable terminals offer a selection of characters. If the correct one is available, the user will not have any problems.

Terminals even more sophisticated than this allow the user to specify which character or sequence of characters defines the end of a field/line-message sequence. These characters are then used in every block transmission request until they are changed again.

Implementation Questions

With respect to flexibility of implementation in terminals, the following list of questions summarizes other points the user should consider.

- Can a block terminal be limited to a single field, line, entire screen, portion of screen or unprotected areas only, depending on the application?
- Can adjacent screen locations have different attributes (such as blinking reverse video adjacent to half-bright, protected normal video)?
- Are all combinations of video attributes offered or are they linked (such as half-bright allowed only for protected screen areas)?
- Are all functions accessible from the host computer?

Important Limitation

On the last point, surprisingly, the majority of computer terminals offer functional capabilities available under keyboard control but not under host computer control. This in itself is the single most important limitation of the majority of smart terminals.

The majority of capabilities are often implemented from the host computer, and terminals not offering this flexibility are severely limited as to what can be done with an application.

Finally, there is one more significant issue in implementing terminals:

- Are the "programmable" function keys truly programmable, or do they generate a fixed code that hopefully will be compatible with the host computer system?

As a third example of terminal capabilities used to off-load a host system, truly programmable function keys can do more than alert the system. They can perform commands such as defining windows, sending a message to the host and setting up fields. They can also be used to transmit a long sequence of characters that would normally be typed by the operator.

Pincus is executive vice-president of Human Designed Systems, Inc., in Philadelphia.

Smart Units Cut Response Time, Give Windows

By Roger S. Pincus

Special to CW

An important benefit of microprocessor-based "smart" terminals is their ability to minimize the number of characters transmitted in a data communications network, thus enhancing the network's responsiveness to the user.

Probably as much as 75% to 80% of remote DP applications are run at 1,200 bit/sec or slower speeds, normally over telephone lines.

One capability of smart terminals that can significantly improve responsiveness at those rates is repeat character generation.

This capability allows a character to be displayed on a remote CRT screen as many times as needed simply by transmitting a few characters to that remote terminal.

On Human Designed Systems, Inc. Concept terminals, for example, only four characters are needed to draw a line of 80 characters. This saves 2.5 sec in network responsiveness at 300 bit/-sec. Available with a number of current smart terminal models, such a capability can allow considerable savings in time and expense for such applications as forms drawing.

Block Attribute Setting

Smart terminals can also enhance slow-speed data communications with a capability known as block attribute setting. This allows the user to set attributes within any rectangular portion of display memory.

For example, to put a rectangle in the lower left-hand corner of the terminal display screen into reverse video mode, there is no need for 12 40-char. lines of reverse video spaces to be generated in that area. Instead, the user can send four characters there which say, in effect, "I want this area of the screen to be in reverse video." On the Concept, that technique would save 16 sec in responsiveness.

Moreover, block attribute setting does not change the contents of terminal memory and can be used to highlight areas of the screen after data has been entered into them.

Windows are especially useful for minimizing character transmission because they allow accessibility to a specific portion of the screen as opposed to manipulating data throughout the entire screen.

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More and more OEM's are putting the Dumb Terminal into small business systems. They assemble a package that usually contains a disk, memory, a printer, and a video display terminal — the adaptable ADM-3A.

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Many businesses are using the Dumb Terminal, along with a light pen (Universal Product Code Decoder), to keep track of their inventory. The decoder is interfaced to the Dumb Terminal, and when a piece of merchandise imprinted with a Universal Product Code passes under it, the item is entered into a computer for tallying.

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YOU CAN EVEN TAKE IT HOME TO MEET THE FAMILY.

We discovered that many computer buffs are using the Dumb Terminal as an inexpensive way to upgrade their systems. After all, the equipment found on most microcomputers leaves a lot to be desired. Such as the tiny five or six-inch screen, for instance.

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And people call this a "dumb" terminal?

WHAT WILL THEY THINK OF NEXT?

Who knows? But it seems that as long as there are Dumb Terminals, people will find new, unsuspected uses for them.

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With good, reliable features and a minimum of frills. Nothing could change that. The fact is, we think that's probably the main reason that so many people have come up with so many uses for the ADM-3A.

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Growth Spurred by Better Software

Teletypewriter Terminals 'Dumb' But Popular

By Roger L. Evans
Special to CW

"The computer-on-a-chip means the end of the dumb terminal." How many times have you heard this statement in the years since microprocessors became commonplace? Yet new entrants appear in the dumb terminal field almost daily, and demand continues to grow rather than diminish.

Were all the experts wrong? Is the dumb terminal here to stay?

The reason why the dumb terminal is so popular is that use of minicomputers is growing, especially in business applications where groups of CRT terminals are often used for inquiry response or transaction processing applications such as inventory or order entry.

This growth has been stimulated by the availability of better business application software both from the minicomputer manufacturers themselves and, perhaps more importantly, from the increasing number of systems houses, each of which addresses the needs of a particular industry or profession.

But why do minicomputer users employ dumb terminals? In what way are they different from users of mainframe systems?

Definition of Term

Before proceeding to a discussion of these issues, let me eliminate any risk of a semantic problem by defining what I mean by "dumb terminal."

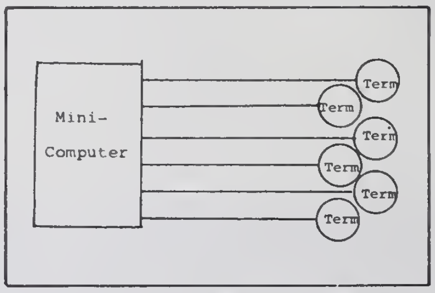

Figure 1. Typical 'Protocol-Less' Terminal Configuration

A dumb terminal is a teletypewriter or teletypewriter-compatible terminal that:

- Runs asynchronously (generally as fast as 9,600 bit/sec; in some cases, even faster).
- Uses no communications protocol or block format.
- Displays or prints data just as it is received, without needing to recognize any predefined addressing sequence or check for block errors.
- Transmits data directly as entered from the terminal keyboard, or from its buffer, without adding any kind of block sequence number or check character.

As a "protocol-less" communications peripheral (see Figure 1), the dumb terminal may incorporate a microprocessor and a very extensive control program that permits it to do very "intelligent" local screen-formatting, prompting, data field validation and range checking. But such a terminal is

(Continued on SR/36)

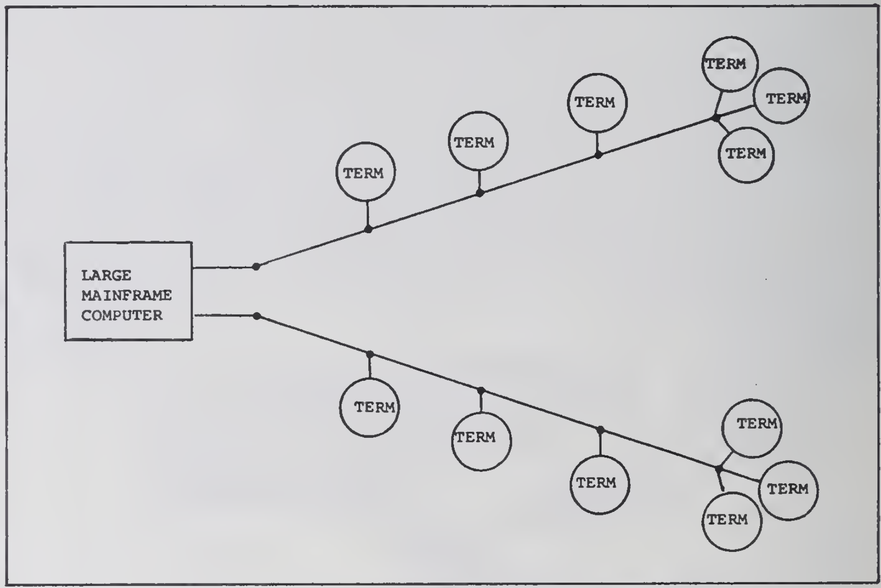

Figure 2. Typical Mainframe-Terminal Configuration

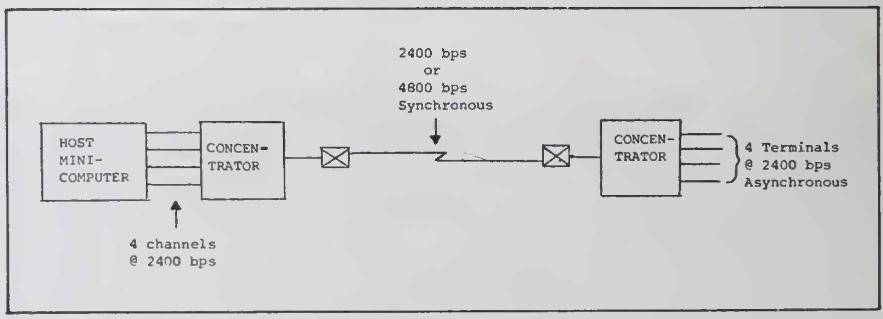

Figure 3. Typical Micro800 Data Concentrator Configuration

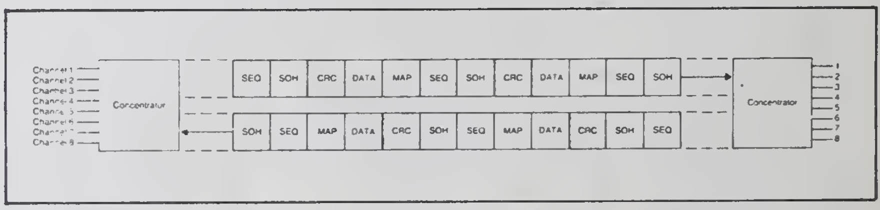

Figure 4. Typical Concentrator Line Protocol

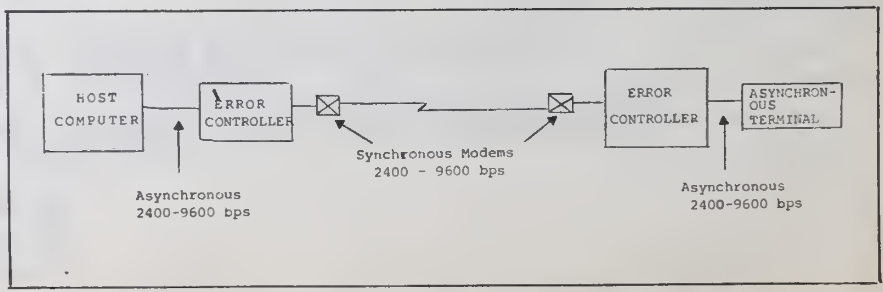

Figure 5. Typical Micro500 Error Controller Configuration

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Intelligence To Light Up GE Network

Special to CW

BRIDGEPORT, Conn. — A supplier of electrical appliances has made intelligent terminals an essential part of plans to implement a data communications network for support of its nationwide warehouse operations.

Known as Expedite, the network will be used by General Electric Supply Co. (Gesco), a division of General Electric Co. that serves contractors, utilities, manufacturers and commercial firms. Gesco hopes that the network's intelligent terminals will help provide such benefits as increased productivity, improved customer service, improved profitability, more accurate inventory information and more efficient purchasing practices.

When completed, Expedite will feature an intelligent terminal at each of Gesco's 173 warehouses. The terminal will consist of a processor, one to 16 video display devices, keyboards, a cluster of mass storage units and a cluster of high-speed printers. The terminal will handle communications interfacing, screen formats, prompting and logical editing.

Joint Effort

The Expedite project began three years ago as a joint effort by Gesco and another General Electric Co. division, General Electric Information Services Co. (Geisco). As GE's computer service arm, Geisco has a worldwide communications network driven by real-time computer facilities in Rockville, Md., Cleveland and Amsterdam, Netherlands.

This Mark III network has local access to most cities where Gesco has a warehouse. Mark III allows terminal speeds ranging from 10- to 480 char./-sec and offers a library of nearly 1,800 software application packages. Expedite will rely on Mark III's Rockville node, where Honeywell, Inc. 6000 series mainframes run under Gcos.

Gesco warehouse personnel will use Geisco's 24K-byte Marklink intelligent terminal to access the Mark III services. Besides Geisco's Rockville processors, existing batch management and administrative systems at Gesco's Bridgeport, Conn., headquarters will process such warehouse applications as price inquiry, order entry, credit checking, inventory control, purchasing and expediting.

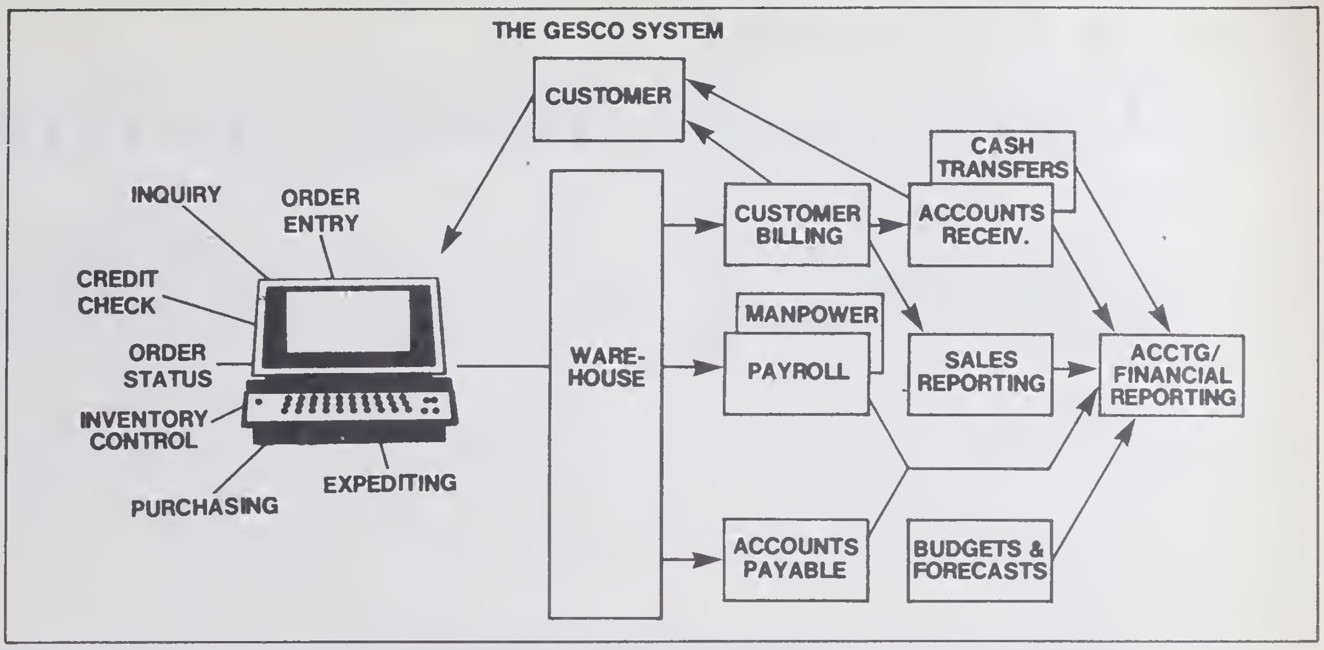
Design Team

The first step in launching Expedite was formation of a joint design team consisting of three Gesco people experienced in that company's operations and knowledgeable of its business requirements, and three experienced systems analysts from Geisco.

The design team spent more than three months in the development of a functional specification. Gesco then spent another six months in seeking comments on the specification and holding various review meetings at all organizational levels to ensure that the functional requirements documented in the specification would lead to the system Gesco required.

The overall design was first pre-

(Continued on SR/34)



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DATAPOINT

Cost, Use, Compatibility

Intelligence vs. Dumbness: An Economic Issue

By Bruce Hoard
CW Staff

DALLAS — The debate over the relative values of dumb, smart and intelligent terminals is in many ways a question of economics. The basic issues are:

- How much money can a potential user afford to lay out for an initial system?
- How much use are intelligent terminals to small and medium-sized businesses?
- How long will it be before today's hardware becomes incompatible with tomorrow's?

There does not seem to be too much doubt that the more affluent user will be opting for "intelligence" over "dumbness" more and more in the near future. Users with less available cash have to take a more pragmatic look at the situation.

Overall terminal costs should remain constant during the next 10 years, according to David L. Pease, product manager for Recognition Equipment, Inc. here. He based that conclusion on the balance of declining costs for some terminal components and rising costs of others.

"In the long run, I'm sure that costs are going to continue to go down for electronic components," he said. "By electronic I mean memories, logic chips and electronic circuitry. You'll also see some nice and significant cost reductions in power supplies.

"However," Pease continued, "other components of a terminal are not going to go down." He said that those other components include cabinets, keyboards, printers and marketing costs.

Revolution or Evolution?

Given the fact that there are an increasing number of applications for intelligent terminals, it seems likely that they will proliferate at a rapid rate over the next 10 years. This poses another economic problem for the less affluent user, Pease said. Will he be forced into revolution instead of evolution?

Put another way, are vendors going to force users into purchasing new terminals by eliminating the upward compatibility of old ones? Today's commonly accepted utility cycle for hardware is six to eight years. What if a user likes his old equipment or cannot afford something new?

"Most of today's vendors do have some level of policy to make new equipment reasonably compatible with its predecessor," Pease noted. "However, it's not as easy to provide that compatibility as you might think."

Installation Costs

He went on to say that the cost of hardware for first-time users composes only about 20% of the user's cost of putting in a new terminal system, while costs associated with internal changes, writing programs and training people make up the other 80%. The 80% portion, Pease added, does not have to be paid a second time when new terminals are added again.

The product manager cited retail stores, supermarkets, hotels and fast food restaurants as cases where intelligent terminals have greatly increased ease of operation. In the case of a fast food restaurant, he noted how a microprocessor-based terminal system with cash registers up front and remote printers in the rear make for quickness and efficiency.

The cash register terminal registers the order, forwards it to the remote printer in the kitchen and tabulates its total. Such a system can also be used for inventory purposes.

Another money-saver for small businesses interested in obtaining intelligence is an augmented service bureau connection. Instead of being totally dependent on the host mainframe for all computer functions, the user can purchase intelligent terminals and/or a microprocessor, which will alleviate a considerable portion of host duties.

According to Pease, businesses can purchase a microcomputer to use as an intelli-

(Continued on SR/38)

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Intelligent Terminals to Light Up GE Network

(Continued from SR/31)

sented in a "design overview document." As each specification was completed for a particular Expedite module, a "walk-through" session was conducted by the designer with colleagues, including those working on related modules, and the project manager.

The final step in the design definition phase was review and approval of the documents by members of the Gesco team. This review was concluded by a joint meeting of Gesco and Geisco personnel to resolve differences and document the final specification.

The Expedite modules were then assigned to individuals for programming. When the coding was completed, another series of walk-through simulations enabled the programmer to review his code with colleagues. These steps helped ensure that the code met the intent of the design specification and significantly reduced the amount of debugging required.

Distribution Points

Expedite will connect each warehouse Marklink terminal with the nearest network distribution point (NDP). There are 11 NDPs at strategic points from coast to coast. Each video display device attached to a given terminal will be able to perform a different function by using a special protocol developed by Geisco.

From the NDPs, data will flow to the Rockville computer center, whose mainframes are interconnected in clusters to maximize availability and reliability. Users are not at the mercy of stand-alone computers since this clustering allows multiple processors to access the same file. When one processor experiences an outage, the application automatically comes back up on an alternate system.

Each host mainframe will process the warehouse data that comes its way, access relevant data bases and transmit data back to the appropriate Marklinks. The host data bases will contain more than one billion characters of storage when Gesco has fully implemented all installations.

Expedite will handle more than 1,600 business transactions per hour with some 800 Marklinks and 200 printers. For order entry applications, a Gesco salesperson will discuss a customer's order on the phone with the video display device on his desk. This procedure eliminates a need for voluminous catalogs, price lists and inventory reports.

The salesperson will be required to know the customer's identification number since Gesco decided this was easier than actually inputting a full customer name. The salesperson will key in the customer number and the screen will return both the customer's name and address.

Next, the salesperson will be given a chance to indicate YES or NO that a given item was requested for purchase. If the indication is NO, a different item will be referenced on the display screen.

The salesperson then will proceed to build line items by keying in either the catalog number or a National Assocation of Electrical Distributors standard number. The system will then return the item's availability and price. When all line items are completed, the salesperson will have an opportunity to recheck the full order on the screen.

Upon agreement that the order is complete, a one-character response is input and Expedite generates a warehouse shipping ticket.

After this warehouse "picking operation," an input clerk will confirm to the system that shipment was complete.

Customer Support

Key support for Expedite is coordinated by a Gesco customer service group in Bridgeport. This group controls software distribution to the field and is the first line of defense for field problems.

Gesco expects to realize significant improvements in customer service through implementation of this system. With inventory balances on-line, the sales person will be able to complete a sale or offer an alternative item without calling the customer back.

Personnel productivity will improve by:

- Reducing the time required to take an order from the customer.
- Reducing the amount of paperwork needed to feed the batch system.
- Reducing the effort devoted both to expediting back order processing and trips to the warehouse to actually confirm inventory balances.

Improved profitability is also anticipated. Timely and more precise ordering of material will result in more economical buying practices and inventory reductions.

The distributed system approach used for Expedite has also demonstrated the viability of managing the integration of complex application functionality and distributed terminal hardware and software deployment with effective, although relatively simple, centrally controlled procedures.

Through teamwork, the efforts of both vendor and customer can be integrated, with the expertise of each contributing to the optimization of a system that will provide the results desired.

With General Electric Co.'s permission, this article was adapted from a presentation by Robert L. Johnson of Geisco at last year's convention of the American Production and Inventory Control Society.

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Buying a Terminal System: Making an Intelligent Buy

By Darrell Crow
Special to CW

Implementing a terminal system or simply upgrading an existing system to maximize data throughput can make heavy demands on the buyer.

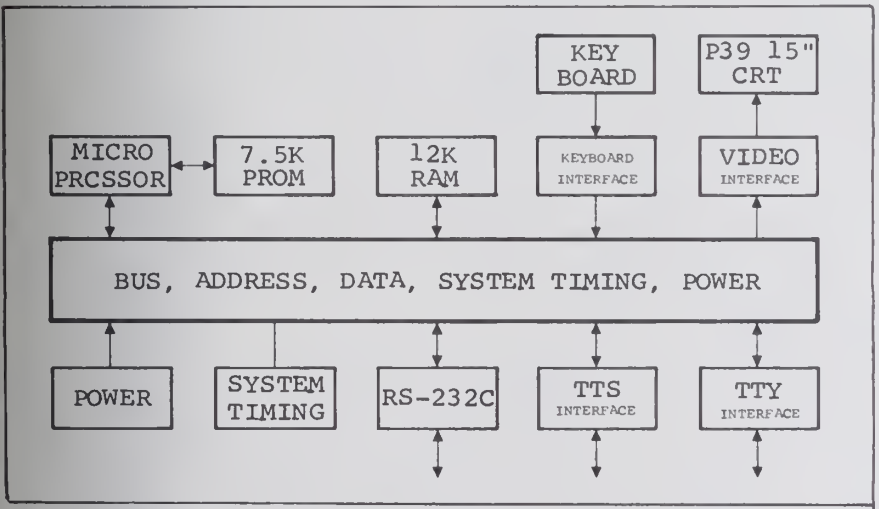
Not only must he be cognizant of the technical definitions of available terminal types, but he must also keep abreast of the breakthroughs in terminal technology that occur almost weekly.

The buyer must decide how to recognize the need for customized or upgraded equipment; how to specify a distributed processing system; how to work best with a vendor; and how to achieve the optimum price to performance ratio in specifying terminal system characteristics.

Software Control

The currently available dumb, smart and intelligent terminals share some basic features. The differences among the various product types exist mainly in how much control the software has over the hardware and to what degree this control allows the terminal to be modified or enhanced to meet diversified applications.

The more a terminal is software-controlled, the more it is intelligent. Obviously, a terminal's functional capabilities and list of supplemental features increase according to its degree of intelligence.



A system block diagram of Zentec's intelligent 9003 terminal as specially modified for use by UPI.

Dumb terminals offer few, if any, operational functions and even fewer operations for interface with peripheral devices. Unlike their dumb counterparts, smart terminals can store data and perform unattended operations such as managing tape cartridges, floppy disks or printers.

A major disadvantage of the smart terminal is simply that its intelligence is limited. Although the smart terminal is controlled by software, this control is limited to the communications protocol, the storing and display of data and the housekeeping chores of managing peripherals.

The control exerted by the software over the hardware does not allow the terminal to be greatly modified or enhanced for very specialized customer applications. Eventually, the smart terminal must rely upon the host CPU's "brain power" for sophisticated operations.

Hence, only a limited number of smart terminals may access a CPU at one time, which severely restricts simultaneous terminal activity within a production environment.

The Zentec 9003 Terminal

The intelligent terminal, however, provides for extended editing and data processing capabilities at a variety of work stations. This in turn allows the main CPU to be free to absorb additional duties.

Intelligent terminals not only boast extended editing capabilities and possibilities for interfacing, but they also have the extra advantage of being user-programmable. This means that the terminal's duties can be programmed by the user as well as by the manufacturer.

As a result, the user can determine the terminal's functions based upon particular requirements at a particular time. The program can be changed by the user when requirements change.

Buyer Guidelines

Zentec Corp. offers users several guidelines on procurement of terminal products. First, the buyer should outline all the functions the terminal will be required to perform. Functions likely to be desirable within a year or so should be anticipated in the equipment selection process.

Second, the buyer should go over the list of functions carefully to determine whether the application can best be served by smart or intelligent terminals.

This decision is rather easy since an excessive number of dumb and/or smart terminals will tie up a host CPU, preventing it from performing certain tasks. An intelligent terminal is required in the event that:

- The user desires an operation in a

(Continued on SR/38)

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Popularity of 'Protocol-Less' Dumb Terminals

(Continued from SR/30)

still "dumb," by my terminology, if it is teletypewriter-compatible.

Without a protocol, a terminal cannot be addressed, so it cannot be clustered or multidropped with other terminals on the same telephone line. And it has no means of assuring error-free data over real-world telephone circuits. As a data communications device, such a terminal is indeed "dumb."

Two Reasons

There are two reasons why such terminals are the rule in the minicomputer world but the exception in the mainframe world (see Figure 2).

First, whereas terminals in the batch-oriented environment of a mainframe are normally remote from the central computer site, the interactive, transaction-processing design philosophy of the minicomputer manufacturers implies that terminals render the sole means of computer access to local users and remote users alike.

Most of these terminals are hard-wired; so they do not need sophisticated retransmission-on-error or line-sharing capabilities.

Second, there is no standard protocol. The communications protocols used in the mainframe world are the inventions of IBM, Univac, Burroughs Corp. and others. Each protocol was defined by a single manufacturer so that terminals and computer software could be developed to support it.

> *'Minicomputer vendors apparently have no strong incentive to invest in a protocol of their own invention. They will instead wait for an international standard to materialize.'*

With such a large majority of terminals attached locally to their host minicomputer, manufacturers of minicomputers have not felt the need to develop and aggressively market a protocol of their own except to enhance communications between computer systems.

Furthermore, with so many of their users satisfied with the present arrangement and so many of their affiliated OEMs and systems houses anxious to preserve the freedom of choice provided by a teletypewriter-compatible industry standard, minicomputer vendors apparently have no strong incentive to invest in a protocol of their own invention. They will instead wait for an international standard to materialize.

Meanwhile, the dumb terminal will continue to thrive. The computer-on-a-chip can still offer solutions to the increasing number of minicomputer users that cannot tolerate the risk of undetected data transmission errors and the telephone line costs associated with usage of multiple dumb terminals at a single office remote from the host CPU.

Although mini manufacturers may be reluctant to define and seriously promote their own protocols, a number of new data communications product offerings provide the mini user with add-on protocol in external, stand-alone "black boxes."

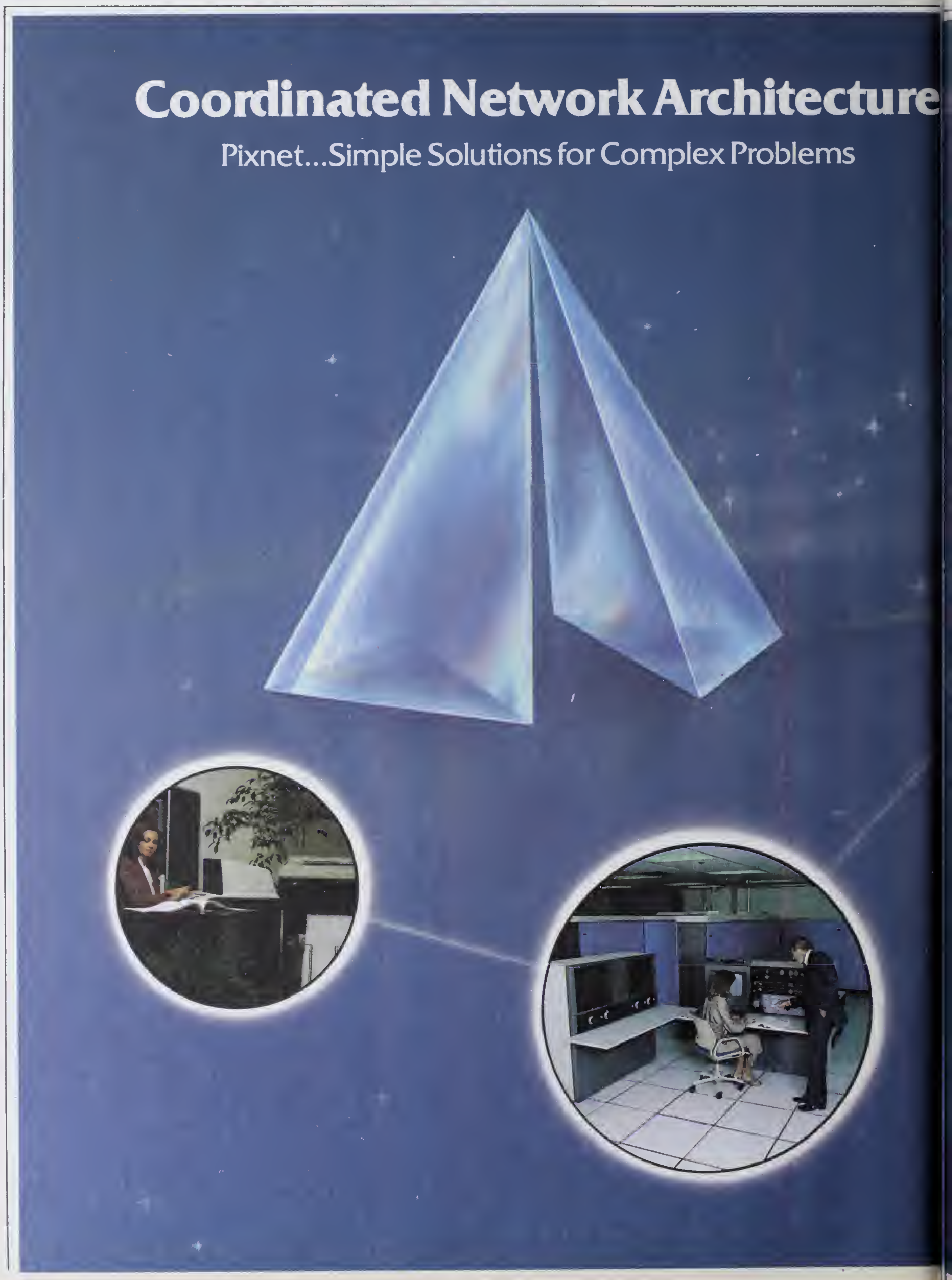
Data Concentrator

The first of these products, Micom Systems, Inc.'s Micro800 data concentrator, was launched at the beginning of 1978. Using a technique known as statistical multiplexing, the Micro800 allows several dumb terminals to share a single telephone line, with one concentrator unit installed at each end of the line (see Figure 3).

The device operates efficiently with interactive CRT terminals since it allocates the shared telephone line to each terminal dynamically, as needed, rather than on a predefined fixed basis.

As a result, for example, the Micro800 can allow four CRT terminals running at 2,400 bit/sec to share a single 2,400 bit/sec line. Moreover, the protocol used between the concentrators incorporates a retransmission-on-error facility identical to that provided by the most recent communications protocols such as IBM's Synchronous Data Link Control.

Thus, the concentrator acts as both an error controller and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cluster controller without requiring any changes to the existing dumb terminal hardware and minicomputer software. It also allows the asynchronous terminals to be used with high-speed synchronous modems.

Data Blocks

In operation, the Micro800 assembles characters from each active channel, building variable length data blocks for transmission down the shared high-speed line. Transmitted block length is a function of the amount of data accumulated since the last block was transmitted.

All data blocks received from the high-speed line are checked for errors, and retransmissions are requested for any block received incorrectly. A microprocessor and random-access memory of several thousand characters are essential elements of a low-cost concentrator of this type.

Figure 4 shows a typical concentrator protocol. Each block begins with a "Start of Header" (SOH) character, which precedes the control information relating to the block contents. The control information will typically contain the sequence number (SEQ) of the block and also the block sequence number of the last block received correctly in the opposite direction.

Mapping Included

In the event that the last block was received in error, a negative acknowledgment (NAK) flag will replace the sequence number of the last block received. The block header also includes mapping information (MAP) to indicate the channels present in the block and the number of data characters for each channel.

Following the control information is the data portion of the block, which is variable in length depending on the number of active channels and the activity rate of each channel.

Finally, a "Cyclic Redundancy Check" (CRC) character terminates the block. The CRC is recalculated at the receiving end to ensure that the data block was received correctly. The CRC is the 16-bit result of a polynomial calculation performed on the bits in the block. There is only a one in 10^{12} probability that the CRC will check out correctly with a block in error.

'The availablility of add-on protocol provides a shot in the arm for the dumb terminal by eliminating data transmission errors and facilitating cost-effective remote terminal installations.'

For single installations, low-cost, single-channel devices are available to provide retransmission-on-error as well as the mode conversion necessary to allow an asynchronous terminal to operate with synchronous modems at 2,400 bit/sec and faster speeds. Figure 5 shows a typical configuration of one of these intelligent asynchronous-to-synchronous converters.

'Black Box'

Using an external "black box" to provide an add-on protocol may appear an expensive solution compared with the alternative approach of building these same functions into a smart terminal's firmware and the minicomputer's software.

But if the packaging costs can be kept low enough, the external black box in conjunction with a mass-produced, multisource dumb terminal may remain competitive even if the mini vendors eventually decide to develop a protocol they would support with cost-effective hardware and software.

The availability of add-on protocol provides a shot in the arm for the dumb terminal by eliminating data transmission errors and facilitating cost-effective remote terminal installations where several terminals are required.

The combination of dumb terminal and intelligent terminal black boxes will ensure a bright future for dumb terminals by allowing the customers to benefit from the low cost of those devices without suffering from the inherent problems of no communication protocol.

Evans is Micom Systems' marketing vice-president.

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PIXNET's design philosophy allows all devices within the network to appear to the host processor as locally attached. Data is sent and received under complete control of PIXNET's local control unit (LCU), which interfaces to the host's data channel, providing processor to processor and processor to terminal communications. Distribution of data is totally transparent to the host processor, resulting in reduced processor overhead and increased efficiency.

To provide the link between LCU's and remote sites, PARADYNE has implemented synchronous data link control (SDLC) line protocol. PIXNET's SDLC adds additional efficiency because its unique data compression routines result in higher performance throughout the network. The compression scheme is transparent to any combination of device addresses or user data. Thus, the user can expect a significant reduction in the number of bytes transmitted.

Intelligence is placed in PARADYNE's network control units (NCU's), which are positioned at key locations throughout the network. The NCU is minicomputer-based and is responsible for all network traffic, providing multiple application access, multiple CPU access, application switching, alternate routing and line concentration. The NCU permits total network control, independent of host processors.

PARADYNE's remote control unit (RCU) provides the interface between the PIXNET communications system and PARADYNE or IBM peripherals located at sites away from the processor. The RCU contains integrated controllers that support PARADYNE card readers, line printers, magnetic tapes, diskettes, 3270's or a hard copy console. Finally, the RCU can duplicate the IBM multiplexer channel and allow IBM peripherals to be supported.

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Terminal Systems: Making an Intelligent Buy

(Continued from SR/35)

tion in a stand-alone environment for output to floppy disk, larger data base, printer or other peripheral.

- The user needs more preprocessing at the individual terminal level.

An intelligent terminal allows each operator to do a number of functions and transmit to the host CPU only when absolutely necessary. This greatly reduces both lease-line costs and host computer time.

Getting Vendor Proposals

A third recommendation is that the user circulate a formal terminal specification, with the list of desired functions, among the manufacturers being considered. The vendors should be asked to submit proposals to meet the specification, which should include a full description of the application, cost objectives, potential problems and any required bidding guidelines.

Many terminal manufacturers may wish to send a technical team to visit the user's facilities and discuss the functional requirements.

After defining the application and deciding on the type of support equipment, the buyer should narrow the choice of suppliers to a single company. It is useful at this stage to visit all potential suppliers to determine whether all are capable of producing a high quality terminal.

While visiting a plant, the user should also inspect product documentation and ask for specific suggestions for each technical problem the application poses.

Special Conditions

Remember that among the matters important in specifying a terminal are interface requirements, environmental factors and architectural design. For printers and other peripherals, one may well need special hardware or firmware built into the system. The user may also need to define the exact protocol required.

Special temperature and humidity constraints may be warranted for users located in areas like Fairbanks, Alaska or Needles, Calif. For operation in air-conditioned rooms, stringent environmental specifications may be bypassed, however.

A final caution to the user: If you have a requirement, state it. If you have a problem and want it solved, state that and leave the solution to the vendor. Unnecessary requirements are costly to both user and manufacturer.

Crow is a marketing systems analyst for Zentec Corp., a manufacturer of data communications terminals based in Santa Clara, Calif.

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Intelligence A Cost Issue

(Continued from SR/32)

gent terminal for a few thousand dollars and get valuable service from it. He cautioned that it would be slower than a more expensive model.

"But," he said, "if you have a low volume of business transactions to process, slowness does not penalize you. A small business might have 100 customers while General Motors Corp. has hundreds of thousands."

Another advantage of intelligence for the small user is its tendency to bring into the DP process people who previously lacked the necessary training. An order entry clerk can use an intelligent terminal to handle the order entry function and at the same time be doing the data processing job of evaluating inventory.

On the question of waiting for more sophisticated technology to arrive on the scene before purchasing new terminals, Pease indicated that today's equipment is viable for today's needs and added that he thought it was important for users to establish an "experience base" of managing information resources.

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April 1st Conference (Exhibit hours: 10:00-5:00)

D-1 8:45-9:45 EXECUTIVE BRIEFING: INFORMATION SYSTEM PLANNING John Lusa, Executive Editor of INFOSYSTEMS magazine, and other senior systems executives will discuss improving EDP productivity and effectiveness with end users.

D-2 10:00-11:00 IMPROVING COMMUNICATIONS WITH END USERS George Kops, VP of Communispond, will discuss how to improve relations and prevent misunderstandings over project definitions, schedules, etc.

O-1 11:45-12:45 HOW WORD PROCESSING CAN BREAK THE OFFICE PAPERWORK BOTTLENECK Thomas Meadows, Managing Consulting Mgr. at Peat, Marwick, Mitchell and Company will speak on improving office productivity via WP management, implementation and telecommunications.

O-2 11:45-12:45 HOW TO CUT COMMUNICATIONS COSTS

M-1 1:30-2:30 AUTOMATION FOR PLANT PRODUCTION AND TESTING APPLICATIONS Robert Jimenez of Advanced Systems Planning at Texas Instruments will describe how manufacturing tests and data base technology can improve productivity.

D-3 3:30-4:30 COMPUTER GRAPHICS, NEW WAYS TO VISUALIZE COMPUTER INFORMATION FOR BUSINESS, ENGINEERING AND RESEARCH USERS Alan Arnett, Hewlett-Packard's Dallas Manager will lead a tutorial and panel on applications.

M-2 3:30-4:30 HOW DISTRIBUTED PROCESSING IMPACTS SYSTEMS DESIGN IN MANUFACTURING Douglas Sewall of Arthur Anderson & Company's Administration Services Division will discuss why new systems design techniques are needed to maximize DDP's potential for productivity endorsement in plant/office.

DAY 2

O-3 8:45-9:45 COMBINED WORD AND DATA PROCESSING Presentation of concepts, equipment, technology and installation of shared minicomputer systems will be made by Mark Goode, Principal Consultant at George Goode Associates.

D-4 10:00-11:00 DATA BASE OPPORTUNITIES IN CENTRALIZED SYSTEMS Doyle Carter of Performance Development Corp. and Michael Sanders, Cullinane Corp.'s Regional Manager will provide status reports and provide specific Dallas area application materials.

D-5 11:45-12:45 DISTRIBUTED PROCESSING, UPDATE ON NEW APPLICATION AND DISTRIBUTED DATA BASES Introduction will be by Doyle Carter of Performance Development Corp., and applications material on improving clerical productivity and customer service will be presented by United Services Auto Assn.

April 2nd Conference (Exhibit hours: 10:00-7:30)

D-6 1:30-2:30 MONITORING EDP PRODUCTIVITY THROUGH BETTER COST CONTROLS Consultant Ronald Muns will describe a methodology for measuring cost components and total costs of your computer applications.

D-9 1:30-2:30 YOUR BUSINESS... AND HOW TO GET READY FOR SMALL COMPUTERS Selecting and operating a small system will be discussed by Ross Churchill, President of Churchill Systems, Inc. Consultants.

D-7 3:30-4:30 SMALL AND DESK TOP COMPUTERS FOR PROFESSIONAL AND BUSINESS APPLICATIONS Steven Scott, Mgr., Digital's Computer Store, and a panel of Dallas desk-top users will tell how small computers can solve big managerial and technical problems.

O-4 3:30-4:30 LINKING WORD PROCESSING AND PHOTOTYPESETTING TO CUT REPROGRAPHICS COSTS

April 3rd Conference (Exhibit hours: 10:00-5:00)

D-8 8:45-9:45 ENHANCING SOFTWARE/APPLICATION PRODUCTIVITY FOR END USERS New programming techniques, including structured analysis methods, will be discussed by Grady Easley of Consulting Associates, Inc. and Michael Sanders, Regional Manager of Cullinane Corporation.

O-5 10:00-11:00 HOW TO USE COMPUTERIZED TELEPHONE SYSTEMS

O-6 11:30-12:30 OFFICE OF TOMORROW: INTEGRATED INFORMATION SYSTEMS Carl Blonkvist, Sr. VP and Regional Mgr., Booz, Allen & Hamilton, will make a slide presentation emphasizing improving executive and professional productivity.

S-1 1:30-2:30 SMALL COMPUTERS FOR MARKETING & DISTRIBUTING APPLICATIONS Thomas Berliner and Dr. Blair Stephenson of Pegasus Systems Associates; and Eric Lentz and Scott Hankin, Consultants at LWFW will discuss maximizing productivity via marketing information systems.

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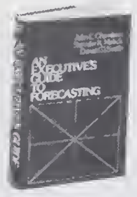

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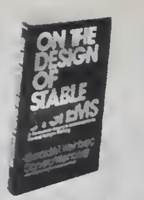

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For On-Line Applications

Local Dumb Terminals Make Sense for Insurer

Special to CW

NASHVILLE, Tenn. — When a major insurance company here decided to develop an on-line system to help run its business, it chose dumb terminals for the job.

The choice made sense for the applications and the system structure, according to Vice-President Morgan W. Huff, who heads the electronics operations for the company.

Two terminal upgrades later, the Life and Casualty Insurance Co. of Tennessee is still using dumb terminals for its major interactive applications — TC 277 units, with 1,920-char. screens, from Telex Computer Products, Inc. — and is very happy with the decision, Huff indicated.

The DP department is using a pair of IBM 370/155s while awaiting delivery of an IBM 3033N. With the two processors, Life and Casualty has five line printers, 30 spindles with IBM 3330-compatible double-density disks and 16 6,250 bit/in. tape drives, all from Telex.

One of the 155s has been modified — "DATed" — to handle virtual storage operations under IBM's MVS operating system, partly because that is the target environment for the 3033N and partly because Life and Casualty's parent company, American General Insurance of Houston, has set it as a company standard. Huff will retain the upgraded 155, but replace the other when the 3033N arrives.

Local Terminals

That tells part of the story but the more impressive part may be the fact that the computers are truly accessible to the users — when the access seems appropriate. There are, for example, 110 local terminals for a staff of 800 people supporting field operations at the home office. That's just about one terminal for every eight people.

On the other hand, the company also made the decision that remote terminals to tie its 144 district offices into the home office would not be cost-effective at this time.

Although the district offices are spread throughout the southeast states, their procedures have been streamlined to the point that, on average, there are only one and a half clerks in each office "and there isn't any real need for a remote network," Huff said.

About 18 agents are based in each office, with a district manager in overall charge, supported by staff managers each of whom handles six of the agents. That two-tiered management structure keeps the district office small and overcomes much of the bureaucracy that might justify the remote net.

Ten Applications

Within the home office, Life and Casualty has 10 different teleprocessing applications. One of the company's 370/155s, running under Informatics, Inc.'s Intercomm teleprocessing monitor system, helps generate an average of 250,000 transactions every week. Six of the systems are for query only, but the other four are interactive and include on-line data entry as well as query operations.

The largest of the interactive applications — responsible for 75,000 to 80,000 transactions per week, or about one-third of the total volume — controls issuance of policies, tracking all the steps for each policyholder from receipt of initial paperwork from the field agent through underwriting decisions and release of the first policy.

Updating of the master files — which now include 2.3 million regular life policies an another 2.9 million industrial policies — is the purpose of the next largest interactive system, Huff noted.

The original terminals used by Life and Casualty came from The Wylie Corp. and were limited to 480 characters on each screen display. In time these were replaced by units with larger screens from Terminal Communications, Inc. (TCI), a firm which Telex acquired. When Huff needed upgraded equipment, he installed the Telex TC 277 units, he explained.

Dumb Unit Selection

When the latest terminal selection was made, Huff considered IBM's 3277 devices, which are compatible with the Telex units. Though the IBM units performed well in test operations, he found a comparison of the price tags was a big factor in deciding to go with Telex. The units he picked were dumb terminals costing about half as much as the IBM terminals, Huff reported.

Why dumb? Since all the terminals are being used in local mode, there are no telecommunications line costs, often a valid consideration when trying to decide if data entry editing, for instance, should be done at the host computer or at the terminal. As long as it doesn't cost anything to pass the data and the editing results back and forth, and the host computer has the capacity to handle the editing, it wouldn't make any sense to get more sophisticated gear to do the work at the terminal site, he reasoned.

In any case, he added, it's more important to have intelligence in the people using the terminals than in the units themselves.

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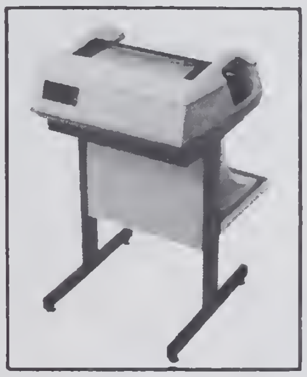

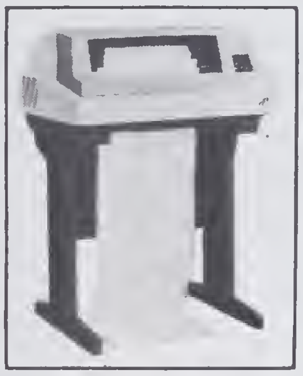

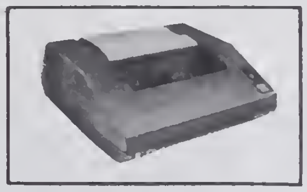
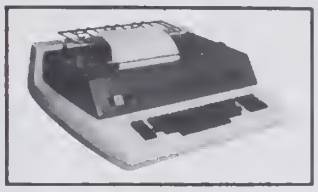

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Initial Cost vs. Price/Performance

Intelligent Units May Be Cheaper in Long Run

By John A. Hill
Special to CW

A very wise man once said, "It is unwise to pay too much, but it is worse to pay too little. When you pay too much, you lose a little money — that is all. When you pay too little, you sometimes lose everything, because the thing you bought was incapable of doing the thing it was bought to do."

This advice applies to computer terminals. In cold, hard cash and on a strictly one-to-one basis, the dumb terminal is cheaper, because it can be manufactured on a volume basis with absolutely no difference between one terminal and the next.

In actual operation, however, the intelligent machine provides cost savings that far outweigh its greater initial expense. For example, an intelligent terminal generally reduces the number of keystrokes required of the operator, thus reducing labor costs. It also minimizes the communication required between the host computer and the terminal, thus reducing the time and cost of the overall DP operation.

Long-Term View

With the constantly increasing cost of telecommunications and labor, the acquisition of an intelligent terminal can lead to considerable cost savings in a comparatively short period of time, even though the initial cost of this type of terminal is higher. The astute and forward-looking data communications manager recognizes that an intelligent terminal tailored to his application will save his company more money and will provide greater operational efficiencies than the unsophisticated terminal.

It is the responsibility of the manager to convince his superiors that the greater initial capital expense is indeed worthwhile and will also safeguard the company against premature equipment obsolescence that is inherent in most unsophisticated terminals. However, if past experience is a guide, many people will continue to limit their capital expenditures today by opting to purchase equipment that meets today's minimum requirements without considering future growth.

Although intelligent systems have grown in popularity in the last five years, their capabilities and advantages are generally not clearly understood. Many people do not fully understand the overall capabilities of intelligent terminals and, therefore, they tend to be more critical than knowledgeable.

This type of attitude frequently prevails in the finance and accounting departments of many companies where "how much is it" is the main, albeit shortsighted, consideration.

Cash Considerations

The manufacturers of intelligent terminals can be grouped into two broad categories: (1) those who produce a terminal on a production basis and make the customer adapt his operation to the equipment and (2) those who look at the client's requirements from the standpoint of operating efficiency and adapting the terminal to the client's way of doing business. The choice is again one of buying cheaper because of present cash considerations or buying price/performance to assure long-term advantages.

Even if price is your only concern, the intelligent terminal may come out ahead. The Megadata Corp. UETS terminal, for example, can communicate with a number of different host computers, satisfying several different protocols. One UETS can replace as many as six less intelligent terminals.

Thus, though on a per-terminal basis the UETS is considerably more expensive than the average terminal, it actually saves money because it reduces the number of types of terminals you need to acquire; it also reduces operator training time and provides better operator utilization, again lowering overall costs. The advantage of one-vendor maintenance must also be considered.

More and more prospective buyers are looking at the long-range advantages of intelligent terminals and are not just looking at immediate costs. The costs differential in buying intelligent rather than dumb may be very narrow if all aspects are considered. In my opinion, a thorough and accurate evaluation of real costs will usually come out in favor of the intelligent terminal.

Of course, many other considerations must enter into the decision to change from unsophisticated to intelligent — the number of systems already installed, the change of software that is required to accommodate the new capabilities and, most of all, the actual cost of evaluating all the factors that must be considered when changing from one type of terminal to another.

Having been in the sales and marketing end of the applications-oriented intelligent terminal business for many years, I must admit that I may be somewhat biased in favor of "intelligent," but all I am really trying to say is that an unprejudiced evaluation will in many cases clearly show that initial expense should be a secondary consideration when put side-by-side with long-range price/performance.

John A. Hill is president of Megadata Corp., a manufacturer of applications-oriented intelligent terminals.

The MEGADATA RTE is not only a stand-alone word processor with all the necessary write and edit functions but, at the flick of a switch, it also becomes a full-fledged data processor. In this mode it can communicate with most sophisticated computers in sync or async—even 83B. And to your computer it looks just like an I-3270, I-2260, U-100, U-200, TTY, or H-2000.

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Terminals Free Pharmacists for Patient Care

LIVONIA, Mich. — More than 350 pharmacists have hired an extremely efficient assistant. And this assistant's "salary" is only $600/mo.

Retail pharmacies throughout a nine-state area have turned over the tedious clerical chores involved in prescription dispensing to a terminal system so that the pharmacists are now free to concentrate on patient care.

The computer system is part of a special program offered by 3-P.M., Inc., Pharmacy Services Division, a large supplier of data processing services to chain and independent pharmacies.

Designated "Pharma-Serv," it consists of a Lear Siegler, Inc. ADM-1A Keyboard CRT terminal and a printer installed in the pharmacy, which communicate over telephone lines to a Magnuson Systems Corp. M80/4 at headquarters here and to an IBM 360/50 at 3-P.M. regional computer centers in Seattle and Miami. The customer pays a $600 monthly fee for the service.

3-P.M. was founded in 1970, specializing originally in a batch-billing and accounts receivable system, which now processes more than a million third-party billing claims per month for more than 1,500 pharmacies. Similar services are also offered to medical laboratories and physician clinics.

Prescription Processing

"The computer programming developed for Pharma-Serv by 3-P.M. records, maintains, updates and instantly provides, on request, patient profile information, prescription pricing, third-party billing information, data on allergies, adverse drug reactions and chronic medical conditions," Thomas Cook, vice-president of Pharmacy Services, explained. "As a clerk types the prescription into the terminal keyboard, Pharma-Serv automatically directs the printer to print the label, compute the price, provide automated pricing and billing of third-party prescriptions, type a receipt and update the patient's billing records and prescription profile.

"All of this is accomplished in less than 20 seconds for a new prescription and 10 seconds for a refill," Cook indicated. "And since most of our customers process anywhere from 65 to 600 prescriptions per day, speed is definitely of the essence.

"We estimate that the system types the label, receipt, daily log and patient profile in 25% of the time that would be required for manual operation."

Third-Party Billing

According to Cook, all third-party billing is handled by the Pharma-Serv system. The computer captures the necessary information and creates two magnetic tapes: one for submission to Blue Cross, welfare claims services or other carriers and the second as an accounts receivable file for each pharmacy.

"The carrier uses the tape to pay the pharmacy, sending checks directly to the store and returning all payment information on a tape to 3-P.M. when it is available," he said.

"We compare the two tapes for accuracy and prepare an accounts receivable report for each pharmacy detailing the transactions for the month."

Further, 3-P.M. also assumes full responsibility for maintenance of the equipment and the program as well as up-to-the-minute pricing information.

"This latter feature is an asset because the average pharmacy may stock 3,000 items," Cook said. "Products are constantly increasing in price at a rate of 12% to 14% each year."

Errors Reduced

In addition, errors caused by hand-figuring, estimated by Cook at 2%, are eliminated, and an automatic monthly inventory report prevents the normal tendency toward stock buildup.

"The CRT terminal is the link between the host computer and the pharmacist," Cook said. "With all of that data traveling back and forth and the complexity of the tasks, the equipment chosen for use in the pharmacy must be as foolproof and reliable as possible.

"The Lear Siegler terminal meets our reliability needs, and it is easy to use. After all, the pharmacists and clerks are not computer experts," he said.

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Micros Challenging Programmable Terminals

(Continued from SR/23)

cannot be matched by equally expensive programmable terminals.

Another View

At Radio Shack, a subsidiary of Tandy Corp. in Fort Worth, Texas, and a maker of personal computer systems, the future of the microcomputer probably includes interactive communications.

Communications and computing will likely fall on the shoulders of the larger TRS-80 Model II, however, instead of the first-introduced Model 1, according to John Shirley, vice-president of the firm's Computer Division.

"In the early days of these products, applications for the Model 1 seemed to be hobby-oriented; now some users are beginning to access Micronet and other low-cost data bases. But I don't believe it has been a major selling factor, largely because it would require a substantial cost to get up to the full communications ability required for many business applications," Shirley explained.

> *'The desktop microcomputer should show by its applications that it is not a toy and has serious possibilities for applications, some of which cannot be matched by equally expensive programmable terminals.'*

Communications Ability

The Model II is another story, however, and its uses will probably be widespread. "We built a lot of communications ability into the Model II because we thought there would be a market for it. And indeed there is," he added.

The TRS-80 Model II has two serial ports, one of which operates in a high-speed bisynchronous mode. It is being requested with bisynchronous protocol for use with IBM CPUs and a "fair number will be used as small computers with a certain amount of time spent in a data transfer mode," he said.

"They will not be used so much constantly on-line, but more for batch dumps after being used as a stand-alone computer," Shirley said.

Future of the Market

"We feel that communications will be a major part of the home computer business if it comes about at all," Shirley said, but he also expressed some reservations about the market's future.

"As far as we are concerned, the home CPU market has not occurred yet. At its price, the micro does not have a ghost of a chance of being used in this respect. To make it work in that context, communications ability will be required," Shirley said.

The laws and regulations of the U.S. point toward the establishment of an interactive microcomputer configuration rather than the "one-way feed" of information represented by the British Post Office's Prestel service, he indicated.

The Model II would be ready for such a use because it has all the built-in software for ordinary serial communications. However, software for IBM bisynchronous protocol is not yet being marketed by Radio Shack, although the firm will probably introduce it "in the not-too-distant future," Shirley indicated.

The market for microcomputers, purchased both by large operations to give executives personal computing capability and by "mom and pop" operations may change if the micros can be pushed into the educational sector.

"We are pushing for its use in education to get the systems in the schools so people aren't afraid of them. This may help the home computer market, which is now largely undefined," Shirley continued.

Of those micros sold for use in the home, the majority are aimed at children's education, with others used for applications such as stock market data manipulation. Otherwise, the home computer of the future may be essentially invisible, he said, built in as part of a new house for process control applications like temperature control and turning appliances on and off.

DECwriter IV.
The leader in terminal printers does it again.

One-Tenth the Cost of Minis

Bank Invests in Micros Rather Than Terminals

By Jay Woodruff
CW Staff

LOUISVILLE, Ky. — A large bank here has installed personal computers — not programmable terminals — in its branches, and they handle or will handle all the applications that would normally be handled by more costly minicomputers.

"We could have done this with minis, but it would have cost at least 10 times as much. A programmable terminal, on the other hand, would have been capable of accessing only the main system.

"We wanted stand-alone computing and the ability to tie into a larger computer," John W. Starks, vice-president of systems and planning at the Bank of Louisville, said.

The bank has installed a total of 55 Apple Computer, Inc. Apple II personal computers in its 25 branches and main office, each with 48K bytes of memory and, usually, two floppy disk drives totaling 116K bytes. They are connected over phone lines to a bank of five Apple IIs through auto-dial modems.

At present, the Apples are used to process loan applications, mortgages and printing of both loan and mortgage documents using an attached Trendata Corp. IBM Selectric type typewriter. They also access the Dow Jones stock quotation service and can be connected to Telecomputing Corp. of America's The Source, a message switching service.

By the end of the year, most of the branch departments will be hooked up on-line to the 2M-byte IBM 370/148 located in the bank's headquarters here.

The bank will use a Sorento Valley Assoc. two-drive, 8-in. floppy disk system with controller software as an IBM 3340-compatible interface between the CPU and the microcomputers that will communicate with it. The Sorento 3340 emulator will convert the output of the micros to the Ebcdic format.

For now, an operator of an Apple in a bank branch will communicate with one of five Apple IIs programmed to handle loan and mortgage applications at headquarters.

Loan Processing

Formerly, an application, say for a loan, would be taken at a branch, the data output onto a tape, and the application sent to the main office for processing.

Once the loan was approved, the legal documents needed to complete the transaction were generated at headquarters and sent through interoffice mail or facsimile transmission to the branch to be signed, a method that Starks called "expensive and slow."

Now, instead of waiting for the notes and documents, an operator can access information that was stored in the IBM system when the application was made, put a preprinted document in the Trendata typewriter and order the Apple to generate the information needed to fill it.

Branch Systems

Each branch is assigned a particular Apple system to deal with, but if it is busy, the Applesoft software orders the modem to dial an Apple that is assigned to a low-volume branch office.

A programmable terminal is dead if its host computer goes down for repairs, but the micro can use down-loaded documents (normally "truncated" to fit within its limited memory space) and manipulate them without having to use the larger CPU.

But there is one application that the bank cannot handle on the microcomputers — the bank's savings system, which is too large an application to be held by an Apple.

The Apples may someday be programmed to carry out a number of otherwise difficult tasks. For example, they will be set up to measure customer flow patterns through the bank so it can be determined how to efficiently schedule personnel, Starks said.

But he added that such "extras" are still sometime off in the future.

If you know anything about terminal printers, you probably know something about our LA36 DECwriter II—the largest selling 300 baud terminal printer ever made.

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The DECwriter IV gives you all this flexibility because a terminal that *can't* handle all types of paper isn't just inconvenient. It's also expensive.

For instance, some terminals restrict you to using 8½" x 11" paper—sideways. Which may be fine for some jobs, but awkward for others.

Others force you to put up with the high cost and short shelf life of thermal paper. And they can't handle multi-part forms at all.

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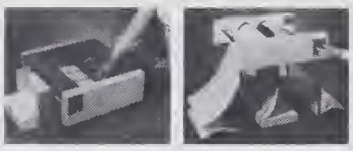

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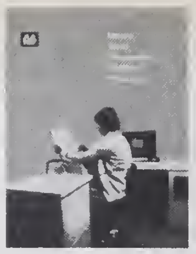

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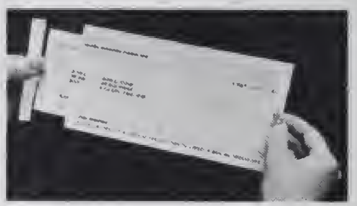

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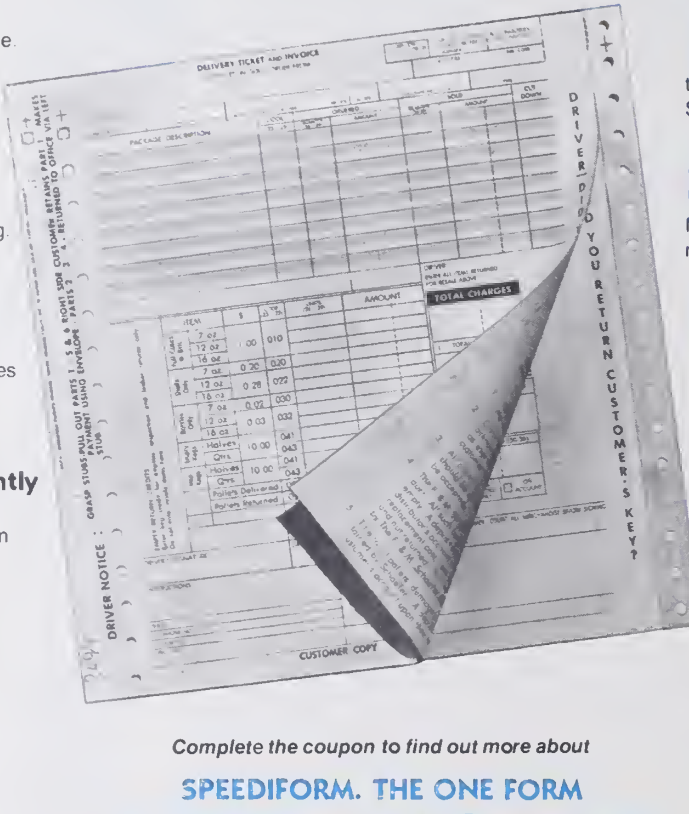
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CW 3-80

In the design of an on-line system, what factors influence ease of use? What determines if a user will use a system repeatedly?

HUMAN CONSIDERATIONS

By Phillip G. Elam

Probably the most important aspect of an on-line system, as far as an online user is concerned, is that it can be used directly by the person with an information need without his having to delegate the search process to a DP technician. This being so, it is all-important that on-line systems be acceptable to both existing and potential users.

This was stressed by Calvin Mooers.

According to Mooers' Law, "An information retrieval system will tend not to be used whenever it is more painful and troublesome for a user to have information than for him not to have it."

Let us consider some of the important factors concerning human acceptance of on-line systems, as well as factors influencing ease of use of these systems. These factors will ultimately determine whether the on-line system is used repeatedly and whether it is preferred to other sources of information.

Studies on the behavior of users in an on-line systems environment are extremely rare. However, the findings of the studies that are available have been summarized and will be presented in the hope that they will enable the DPer to build more effective on-line systems. To ignore the user and his reaction will simply cause users to become frustrated, lose interest in the on-line and turn to alternate sources of information.

If Mooers' Law is accepted as valid, then two questions must be raised:

1) What factors influence ease of use from the user's viewpoint?

2) What ultimately determines whether a user will make repeated use of a system?

There are probably as many answers to these questions as there are users. However, in evaluating the studies referred to above, the following topics came up most often:

- User acceptance.
- Time factors.
- Hardware factors.
- Language of communication.
- System sensitivity.
- Errors and error messages.
- Symbiosis.

The remainder of this article is directed toward expanding and defining each of these areas.

User Acceptance

In a study performed by Dr. R.V. Katter, several factors were presented that appear to influence user acceptance of an on-line system. He defined four "effects" that the neophyte user may well experience at an on-line terminal.

The first is pressure. The immediacy of feedback provided by the on-line system, which is one of its most important and obvious attractions, may in itself be disconcerting and intimidating to some inexperienced users. Because the terminal responds rapidly, the user sometimes feels he must respond equally rapidly. Certain users may be conscious of this pressure and begin to compensate. Consequently, they do not allow themselves adequate time to fully interpret the on-line feedback, they make hurried decisions and their search interaction becomes suboptimum as a result.

The second effect reported by Katter is the peephole effect, which tends to be a characteristic reaction of the user of typewriter terminals. For the inexperienced user, the typewriter terminal may seem like a peephole through which the contents of a data base can only be viewed in very small pieces. Although a system reponse may commence in a relatively short time, the full message is spelled out laboriously at approximately reading rates, and the user is given no feeling of the "conceptual distances" the system may have to travel in order to produce a response.

The typewriter is not a good browsing device. It gives the impression of "plodding" and the user has difficulty in visualizing his complete search strategy, perhaps more so than if he were using a conventional manual method.

All of these factors contribute to the feeling by users that the system is somehow very mysterious.

The user of a CRT display unit is less likely to feel the peephole effect, although it may still be present in a milder form.

A third effect noted by Katter is termed the fishbowl effect. In a manual system, such as a printed index or card catalog, the search is conducted in relative privacy. Some neophyte users feel that this privacy is denied them when they operate a terminal, especially when it is located in a crowded public area, and that their deficiencies in searching and keying are being "monitored" by not necessarily sympathetic persons in the computer installation.

Katter described his fourth observed effect as a lack of sympathy. The on-line terminal is viewed by the user as an expression of the concerns and self-interests of others who do not share the user's local or personal views, values or goals. The remoteness of the computer and data base to which the terminal is hooked is acutely obvious to the new user. At the same time, the remote computer can seem to be an active, somewhat self-governing entity that is busy satisfying the needs and concerns of many other persons, with whom the user may share little.

The new user with such a perception may not expect the system to be very sympathetic. This, in turn, causes the user to feel unsympathetic toward the system, other users and DPers.

Role Reversal

Taken together, these four effects account for the subjective feeling of a subject-object role reversal that has been described by many fledgling users of on-line terminals. Instead of perceiving the system as an object that he, the subject, molds to his wishes, the user feels he is the object that is being molded and manipulated by the system.

Several other reactions and factors will directly affect user acceptance of an on-line system. Some users have an innate phobia of the system's suspected "fragility." They are afraid that if they make a mistake (such as hit a wrong key), it will cause drastic and irreparable damage to the hardware or data base.

Designers and managers of information systems should do all they can to reduce wild fears of this type. However, it is equally important that users be told to abide by system rules and that they not be allowed to "play around" with the system.

Certain other users are hostile because they dislike typing, are very poor typists or basically feel that typing is demeaning or beneath their dignity ("I have had a secretary to do my typing for almost 20 years").

General Enthusiasm

Despite these various adverse reactions, on-line retrieval systems have generally been accepted with great enthusiasm, although not all users wish to conduct their own searches; some still prefer to delegate to an information specialist. In some information centers, the introduction of an on-line terminal attracted new users, users who did not take advantage of previous batch-processing capabilities and even people who had previously made no use of the center's facilities in any form. In some cases, at least, the on-line system attracts requests that

(Continued on In Depth/2)

(Continued from In Depth/1)

would be completely unsuitable for processing in a batch mode.

It is important to realize that the subject-object role reversal concept mentioned by Katter is usually a temporary experience for a new user. The time period associated with this phenomenon depends on how DPers view the situation.

If DPers attentively react to user requests, this feeling tends to disappear with increased practice in using the system. It is also quite possible that the user's awareness of this phenomenon will not be as vivid as depicted here. Nevertheless, some users will be aware of it, and their acceptance of the on-line system will be affected accordingly.

Noncommittal Attitude

Most new users will tend to adopt a noncommittal, provisional attitude toward the system. Although they are not quick to find fault, they will tend to reaffirm the positive values of manual tasks with which they are more familiar.

Two other important factors relating to user acceptance should be noted. The first is novelty. Some use of terminals is undoubtedly because they are new and attractive — their novelty. Even if a user adopts an on-line system when it is first made available, there is no guarantee that he will continue to use it on a long-term basis. To outlive the novelty period, it must help the user solve informational problems.

The second and related factor concerns education. Generally speaking, it is true that when an on-line system is initially installed at a user location, the majority of potential users will not have had previous exposure to any form of on-line terminal. While this novelty may attract certain users, it may very well repulse others who are inclined to avoid the unknown.

This entire situation is likely to change dramatically within the next decade or two as on-line systems are used increasingly for educational purposes in universities, colleges, high schools and even elementary schools. Problems relating to user acceptance, while important now, may be virtually nonexistent in the near future.

Time Factors

The on-line user expects "rapid" response from the system. When he comes to expect a system response of a few seconds or less, he tends to be disturbed if he has to wait much longer.

A study conducted by J.I. Schwartz determined that when response time exceeded 15 seconds because of system problems, hardware malfunctions or unusual conditions, users who were not used to such a delay became both disoriented and impatient. They will generally stand by, however, as long as they are reasonably confident that the system will eventually respond. For this reason, it is important that some form of "Please Stand By" message be transmitted by the system as soon as possible after it is known that processing delays will occur.

Operators using an on-line terminal throughout the working day tend to become bored if they are forced to wait long for system responses. Such boredom soon leads to feelings of fatigue. This factor alone will decrease operator performance levels.

In a study conducted by H. Sackman, it was reported that users with tasks requiring relatively small, simplistic computations (such as those in typical business problems) became increasingly uncomfortable as computer response time to their requests extended beyond 10 seconds and as irregularity and uncertainty of computer response time increased. Users with problems requiring more complex computations (as in engineering or scientific problems) tolerated longer intervals, up to as much as 10 minutes for response time in longer-running tasks.

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yet overlooked, technical considerations is pacing in on-line systems. Pacing involves procedures whereby the terminal user is clearly told what he should uniformly expect in terms of response time. Obviously pacing is accomplished in different ways in different systems.

In another study relating to pacing, Katter and D.A. Blankenship determined that if system response were always instantaneous, the user's attention would never need to leave the terminal except for him to attend to his part of the mutual problem-solving process. In this case, both terminal and user times would be employed at maximum efficiency, since the system would wait for the user only when necessary, and the user would never have to wait for the system. The fact is, however, that response times are usually not instantaneous (or even desirable) so that the user has the possibility of using the delay either for rest or for other work, whether it is related or unrelated to the on-line problem-solving process.

If response times are always short, the user may use the delay for a brief rest or diversionary activity such as shutting his eyes, moving or stretching his body, looking around or moving a paper, or he may passively track the system's activity. As response time becomes longer, however, the user is tempted to use the waiting period for other work. Here a psychological problem can arise because of tension created by the unfinished task when a system response indicates that the terminal is waiting for the user before he has completed the peripheral task which he anticipated he would be able to finish during the delay.

Psychological Benefit

For at least the above stated reasons, it is psychologically rewarding for the user to be able to accurately predict the period of response delay. This would indicate that for some intermediate part of the distribution range of possible response-delay periods, there is a clearly establishable value trade-off for the user between invariability and shortness of the response-delay period. No matter what the length of the required response-delay period might be, as long as it is reasonable, users prefer to be able to predict it accurately.

Unfortunately, many DPers approach on-line systems and response time naively. The initial system will provide the fastest level of response. However, as additional systems and users become involved, response time will degrade. It is therefore important to anticipate an end level of response time (with all systems and users on-line) and create some type of timing mechanism that will stabilize response time. The timing factor in this mechanism is reduced, of course, as new systems or terminals are added until the desired response level is achieved. A simple software loop can be employed to solve this problem.

In their study, Katter and Blankenship described four commonly used devices that can be implemented to pace man-machine interaction:

1. *Confirmatory signals.* These are practically instantaneous acknowledgements that a message entered into the system is being processed. They do not necessarily imply that the message will be accepted as legal or interpretable after further processing.

2. *Attention signals.* These consist of especially noticeable light or auditory signals, signals usually reserved for indicating that the system is now awaiting a response from the user. They may be programmed for single, intermittent or continuous notices. In some systems, the attention signal is usually preceded by the lack of the confirmatory signal that should have followed the completion of the user's action, plus a standard delay to allow the user to notice the absence of the confirmatory signal.

3. *Cuing signals.* These are usually terse, short symbol indicators that show what control actions the user may take, must take or may not take to forward the interaction process. They can be introduced by any of the display devices, but computer-switched back-lighting lamps behind the appropriate function keys are preferable.

4. *Status display.* This consists of a dynamic display that provides the terminal operator with some indication of the fact of, or the state of, computer processing on tasks he has assigned to

(Continued on In Depth/4)

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(Continued from In Depth/3)

it. Ordinarily, it is not designed to capture or demand attention in the same manner as attention signals. In fact, many systems make this an on-request function of the system.

Another aspect of pacing was defined in a study performed by H. Sackman and M.M. Gold. They introduced the element of "interarrival" or "thinking" time. This is the time interval between the completion of computer response and the insertion of the user's next input message. After several independent investigations, the observed median responses were remarkably close, in the range of nine to 13 seconds.

This suggests that there may be some merit to forced temporal spacing between computer messages and human responses to achieve improved human problem-solving. This should facilitate creative thinking. As mentioned earlier, when the system responds too quickly, there is subconscious pressure on the user to respond rapidly also, possibly to the detriment of his overall search strategy. A paced response delay alleviates this unnecessary pressure.

Finally, users particularly dislike unpredictable response times. It is only logical that they should prefer a constant delay to a possible shorter, but variable, response. Unpredictable conditions disturb the user and interfere with his efficient use of the system. This assertion implies that if delays are long, but predictable, a user can conceivably carry on some other activity instead of wasting time waiting for a response that may come now or later. There is, of course, an upper limit to the time frame.

Psychological aspects of response time in man-machine interaction have been addressed in a study conducted by R.B. Miller which identifies various classes of human action and purpose at the on-line terminal. These different human purposes and actions tend to point to the same conclusion — that a response time of around 10 seconds will permit the kind of thinking continuity essential to sustained human problem-solving.

Hardware Factors

The only hardware with which the on-line user is directly concerned is the terminal itself. In order to satisfy his information requirements, the user needs some type of keyboard to allow communication with the on-line system. He needs a display unit in order to view his own messages, as well as system responses. And, finally, he may need printout capabilities. Typewriter terminals can meet all these requirements whereas, if a CRT is used, a supplementary on-line printing device must normally be added.

Nevertheless, CRT terminals offer certain definite advantages over typewriter terminals from the human factors point of view. They generally permit more rapid communication, are less noisy and allow user errors to be corrected more eaily, or at least they give the user the impression of allowing easier error correction; various studies have proven that they may cause more errors initially. A CRT is

(Continued on In Depth/6)

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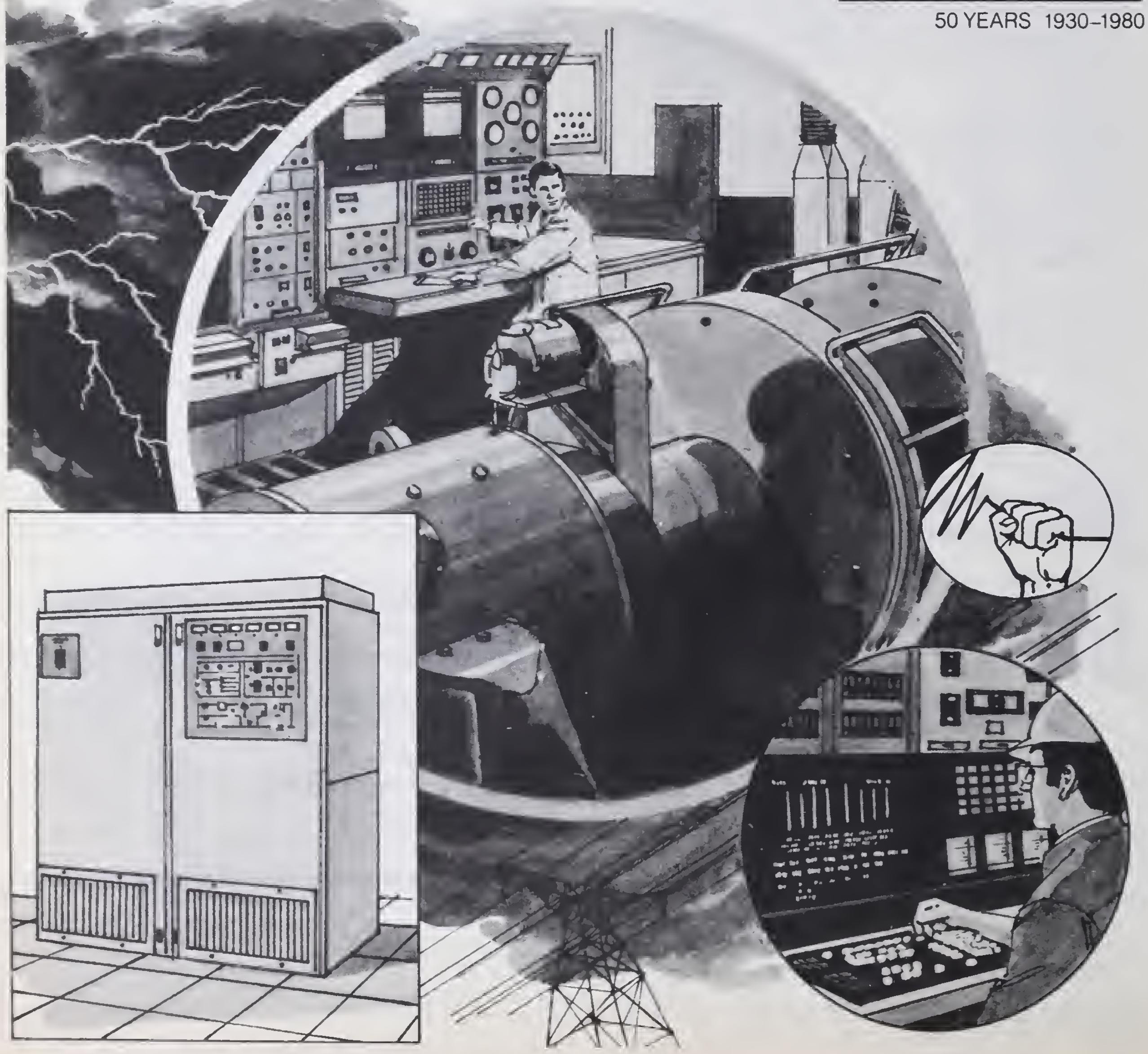

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(Continued from In Depth/4)

almost essential for some types of applications (such as display of lengthy documents), since the time delay associated with a typewriter printout may prove intolerable.

Video consoles also permit a much greater variety in the display of alphanumeric data. This point was well made in a study performed by S.R. Mayer. Basically, he concluded the following:

The growing economic feasibility for man-machine communication offers many new possibilities for improved information display over that offered by teletypewriters. Not only do video consoles improve the display of geometric information, but they offer new opportunities for organizing alphanumeric information into more effective formats than that of conventional linear displays.

Earlier computer display designers concentrated on what was displayed, trying mainly to identify and include necessary information. Display design is now moving toward consideration of how required information should be formatted. New formats, movement or blinking of information for emphasis, timed appearance or disappearance of information and color coding are but a few of the many possibilities that are emerging for computer displays.

Keyboard Aids

The keyboard itself is also important. A keyboard in which keys are dedicated to major system commands or functions saves user time, reduces the likelihood of errors and is overwhelmingly preferred by a majority of users. However, experience has shown that users sometimes have difficulty locating the appropriate key, and others are intimidated by the presence of so many unfamiliar keys on the keyboard.

Keys, control buttons and other devices must be adequately labeled and arranged for orderly use. This should be a primary requisite in selecting terminals.

Visual factors are particularly important to the CRT user. Lengthy use of such a display has been known to cause operator fatigue. The variables that determine image quality include luminance, contrast, regeneration rate (if a CRT is not regenerated fast enough, it gives the impression of a flicker), chromaticity, resolution and size and style of characters. These, too, should be included in terminal selection criteria.

In a study conducted by J.H. Carlisle, an application system was implemented under both typewriter and CRT terminals. The purpose of the study was to determine which device, if either, increased operator throughput — that is, increased the amount of data being entered or retrieved. The behavior of the two terminal groups was compared on the basis of:

- The number of data elements retrieved and examined by the operator.
- The precision of the search measured in terms of a "relevance" score derived by having an experienced information specialist evaluate each retrieval on a 10-point scale.
- Elapsed search time.
- The number of errors made in a search.
- The number of different individual search strategies used by an operator.
- The operator's own satisfaction with his use of the terminal.

Basically, Carlisle concluded that the CRT terminal operators overwhelmingly preferred their terminals, while the typewriter terminal operators were somewhat less enthusiastic. The CRT console users took, on the average, 60% more time, made 300% more errors and achieved relevance scores 40% higher, while retrieving about 42% more data than the typewriter terminal users.

There was a strong positive correlation between the number of errors oc-

(Continued on In Depth/8)

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"We switched to NCR," says Joseph A. Dee of Brooks Camera, Inc.

Joseph A. Dee (left) is president and chairman of Brooks Cameras, Inc. in San Francisco. Jim Sweeney is his NCR Account Manager.

DEE:
Brooks Cameras is the largest photographic dealer in Northern California. And we're growing fast. We just outgrew the processing center that had been doing our computer work. We needed faster turn-around. And we wanted to establish our own priorities.

NCR's SWEENEY:
So you went to your own NCR system.

DEE:
Yes, but not directly. First, we selected a competing vendor's newly announced system. But as we started to plan, we began to see problems ahead. No tape drive. Perhaps no COBOL. Perhaps no match-up with our sales terminals. And all we could get from the supplier were vague assurances that the problems would somehow disappear. So we switched to NCR. Very fortunately, as it turned out, because our NCR system is up and running. While the other vendor is still not delivering the other system.

NCR's SWEENEY:
We are not only delivering, our operating software is fully tested.

DEE:
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NCR's SWEENEY:
You liked Migration Path Engineering, too.

DEE:
Our requirements are too unique for us to expect off-the-shelf application software from any supplier. We have every kind of sales transaction. We accept all the regular charge cards as well as our own. We have rentals, repairs and layaways. And our own special promotions. So once we made the investment in our own specialized programs, we wanted to protect it. Even when our growth forces us to move to a larger system. With Migration Path Engineering, NCR can give us that protection.

NCR's SWEENEY:
And finally, you wanted one supplier who would assume responsibility for the entire system from A to Z — including the terminals.

DEE:
You're absolutely right, Jim.

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NCR
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(Continued from In Depth/6)

curring and the amount of time spent searching, a high negative correlation between relevance scores and number of errors, a weak negative correlation between searching time and relevance scores and a high positive correlation between relevance scores and the amount of data retrieved.

Overall, the study concluded that uses preferred CRT terminals. The user was able to enter and retrieve more data and initially, at least, more errors were generated. However, other studies have shown that the greatly increased error rate at the CRT terminals resulted from the fact that the CRT keyboard was less familiar to the operator than the teletypewriter keyboard. It is important to note that with increased usage (experience) not only did the error rate for CRTs decrease drastically, but the retrieval rate increased accordingly.

Language of Communication

Users should be able to communicate with the system in the simplest possible way. Therefore, commands should be brief and unambiguous. Moreover, dedicated keys are desirable. For the user who is not an information specialist, a system that is constructed around a natural (English-like) language is preferable to one based on codes.

Inexperienced users have a great deal of difficulty with Boolean expressions. They favor systems that will accept an English sentence or phrase as a search argument. In fact, it is desirable to have a comprehensive system entry vocabulary.

Everything possible should be done to reduce keying needed at the terminal. Users should be able to select terms from displays by a term identifier, the use of a light pen or by touch panel. Abbreviations for command names should be acceptable. One of the more common practices is to use default values to reduce the amount of keying needed. More often than not, the user prefers to have the system automatically initiate the most likely action. This would mean that user response would be required only on exceptions.

A limitless number of areas could be investigated to simplify and expedite interaction with the on-line system. The most often overlooked facet of this entire exercise is the need to continually review and enhance the language of communication. DPers, for any number of reasons, tend to install a system, monitor it for a short period and move on to other pressing matters. This means that the user is saddled with a system which may or may not need refinement. If it does and nothing is done to rectify the situation, use of the on-line system will tend to dwindle.

System Sensitivity

From the human considerations standpoint, perhaps the major defect of existing on-line systems is their universal sensitivity to simple human errors. Theoretically, and in practice, an on-line system should be able to accommodate the relatively infrequent user who may never acquire complete fluency in operating the terminal. Unfortunately, most on-line systems require absolute perfection in spelling, punctuation and spacing.

From the user's point of view, it is both irritating and frustrating to have a term rejected for what he considers to be a trivial reason. In addition, the user should be allowed to use common abbreviations and have these abbreviations recognized by the system. Typically, where abbreviations have been used, they tend to be DP inventions and not ones with which the user is familiar.

On-line systems should incorporate at least minimum levels of character-string recognition and other fail-safe procedures to save the time of the user and reduce his frustration. In addition, it may be necessary to provide generic or phonetic search strategies in some types of application systems.

Generally speaking, all of these efforts require extensive DP planning and design activities. Too few organizations have adopted the posture of conforming to the terminal user's needs. In those few organizations in which an effort has been made, it is all too common for an illegal search strategy or simple human error to bring the on-line system completely down. Obviously, great emphasis and attention must be placed on ensuring on-line system integrity. Otherwise, users be-

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"We need the order-entry tracking system by the 1st. The budget consolidation in two weeks. The sales forecast next week. And the seating arrangement for my daughter's wedding by tomorrow."

come suspicious of the quality of the information the system provides.

Errors and Error Messages

When a user does make an error, he should be informed immediately by the system. Error messages must be explicit and should tell the user how to make the appropriate correction. Error correction should be easy and should disturb as little of the search as possible. Where feasible, error correction should not force the search to be aborted and cause the entire entry to be rekeyed.

Unfortunately, too many on-line systems contain poor error messages. It is not enough to tell a user that an error has occurred. He must be told the precise nature of the error and what he must do to correct it. Otherwise, the user will find himself in a frustrating loop. Not only is this a consideration of an application system, but it should be employed in operating systems and teleprocessing monitor communications to the user.

In his study, Sackman identified two types of errors: typing errors and comprehension errors (those relating to system procedures and protocols). The former type of error is more easily detected and corrected. Typing error rates decrease with increased experience in using the system.

One might expect that more improvement might take place in comprehension errors, and that typing errors would be maintained at a more consistent level at some point in the future. Unfortunately, that is not the case. Comprehension errors were found to be highly and inversely correlated with user productivity levels. In fact, not only do comprehension errors remain relatively constant within existing systems, but they actually tend to increase as new application systems are added.

In the Katter/Blankenship study, analysts stated that error-control programs should be designed to:

1. Reduce the probability that the user will produce what he perceives to be an error that the system does not detect.
2. Reduce the probability that the user will generate a message that the system cannot accept or interpret.
3. Immediately notify the user if the message is unacceptable by the system.
4. Immediately diagnose errors and suggest corrective action.

These facts merely reconfirm what other researchers found, but Katter and Blankenship went further in that they suggested the important desirable features of an on-line error-control program. They are:

A. *Entry preparation display:* For controlling the kinds of errors detectable by the computer and humans and those detectable by humans only, a valuable display for the neophyte online user is one that unfailingly shows him clearly and explicity the full message he is about to release to the system for processing.

B. *Entry preparation display editing:* For the message entry display, a valuable provision is the ability to identify the word or phrase in error. In addition, a rapid means for deletion or correction of the word or phrase in error should be employed.

C. *Variable spelling approximator:* Some means should be implemented to handle the most common operator spelling errors. This same vehicle could be employed to facilitate abbreviations.

D. *Flexible error description feedback:* A user, regardless of his experience level, will sometimes need assistance for specific types of entries. Therefore, it is advantageous to include "HELP" screens. For the neophyte user, a detailed help screen may be in order, while a short help screen may suffice for the experienced user. These help screens can either be dynamic or, more commonly, on-request.

E. *System error monitoring:* In order to eliminate system-detectable errors, it is advisable to implement a program that identifies and stores the various types of errors. This is especially valuable during the developmental stages of the system, since this information can be used for system refinement. In addition, if errors made by the user can be saved, the appropriate level and type of subsequent user education can be initiated.

Overall, the identification and correction of errors are among the most important facets of any on-line system. Unfortunately, error handling is also

(Continued on In Depth/10)

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GENERAL ELECTRIC

(Continued from In Depth/9)

one of the most neglected areas. This area alone accounts for the greatest level of user dissatisfaction.

Symbiosis

As the reader might well suspect, man-machine interaction capabilities have by no means been fully exploited. In many applications, a large amount of effort away from the terminal precedes actual interaction with the system. Unfortunately, this approach detracts from the interactive (conversational) benefits to be gained.

We understand that on-line systems should have both extensive searching and browsing capabilities to further the precept of interaction. But what can be employed to accomplish this goal?

W.J. Hansen stressed the importance of user engineering principles for the design of interactive on-line systems. His fundamental principle was, "Know the user."

Hansen strongly stated that users should, whenever possible, select from lists (menus) displayed rather than type character strings. By selecting from a list, the user is spared the need to remember various commands, and the probability of error is thus reduced. Moreover, a CRT console can display many characters in the same time that it would take a user to type very few. Files, commands and other entries should be identified by names rather than numbers.

The system must always respond in a predictable way (it must not appear to be idiosyncratic), and it must inform the user when he needs to be informed as to the status of a particular operation, for example).

The system should be as unobtrusive as possible. Operations frequently conducted should be optimized in terms of command requirements and interaction time. And a display should change as little as necessary to carry out each new request. Otherwise, user disorientation will inevitably occur.

Finally, the system must be engineered to prevent catastrophic errors and to permit easy recovery from as many errors as possible. Error messages should be specific and explicit. The system must be designed to avoid very common errors, because an error that occurs constantly must be attributed to poor system design rather than user weakness. And the user should be provided with an easy method of reversing an action he recognizes as being incorrect, while maintaining data integrity.

This article has attempted to review a few of the human considerations that are important in the design and operation of on-line systems. Human engineering must be employed if man-machine interaction is to be improved. Systems that are poorly designed from the human considerations standpoint reduce the tolerance of the user. If they continue to operate uncorrected, they increase search time which, in turn, increases the overall search cost. But, most important, users become frustrated. And the frustrated user tends not to return for more.

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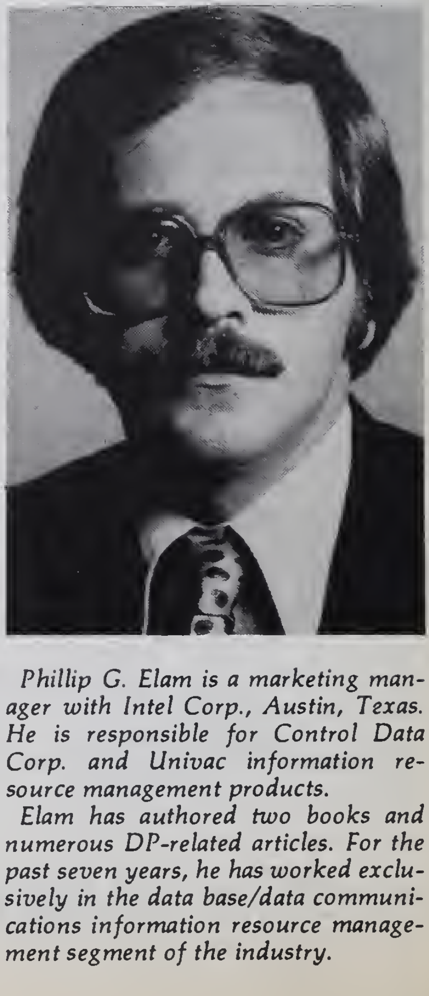


Phillip G. Elam is a marketing manager with Intel Corp., Austin, Texas. He is responsible for Control Data Corp. and Univac information resource management products.

Elam has authored two books and numerous DP-related articles. For the past seven years, he has worked exclusively in the data base/data communications information resource management segment of the industry.

Accepts 370 Programs

Off-the-Shelf Mini Matches 370/158

MT. LAUREL, N.J. — Formation, Inc., a 10-year-old systems designer and consulting firm here, has introduced an off-the-shelf minicomputer system that it said matches the performance of an IBM 370/158 mainframe.

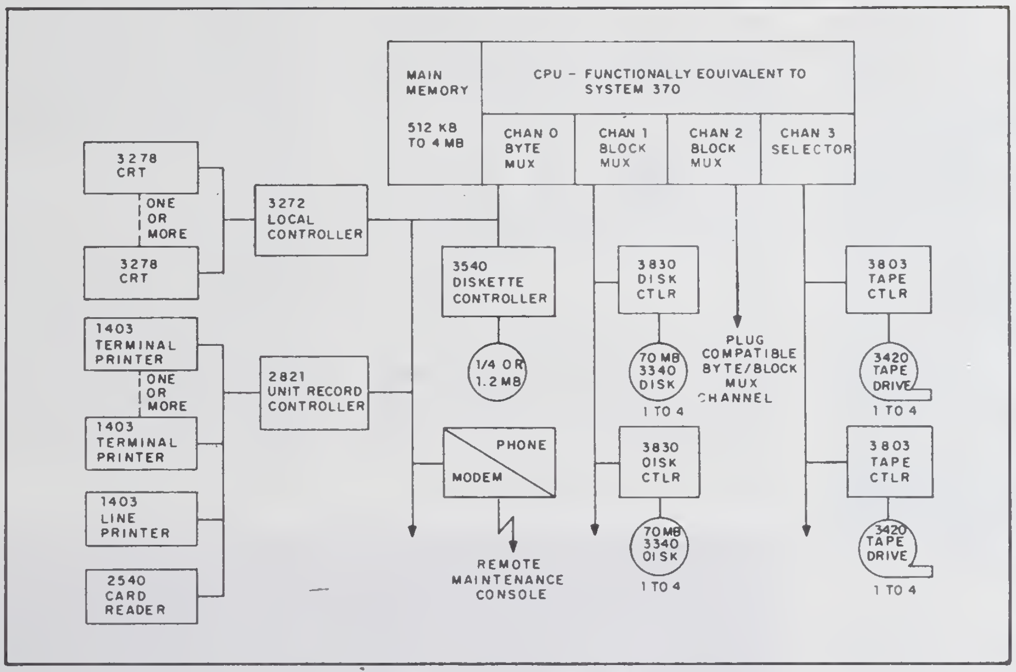
The Formation 4000 Information System is a 32-bit machine that utilizes a high-speed bus with multiple microprocessing units, microcoded to emulate IBM 370 channels and controllers. Therefore, although the Formation 400's hardware is different from IBM's, its "program-equivalent architecture" allows IBM software to operate as though the system were an IBM machine, a spokesman claimed.

In fact, he said, the minicomputer system is not only compatible with the entire 370 program library, it can also accommodate the DOS/VS, OS/VS1 and VM 370 operating systems.

Geared to meet on-line transaction-processing requirements, the Formation 4000 has an error-correcting main memory that can be expanded from 512K to 4M bytes, — a memory expansion capability four times that of the 370/138.

In addition, the system offers parity-protected data buses, a remote diagnostics feature that provides for hardware and software maintenance from a central location and a separate service control processor. The processor runs diagnostics on all of the system's modules, checking their condition each time the system is started and while it is running, the spokesman said.

The system incorporates "extensive" large-scale integration (LSI) circuitry and can take advantage of sealed-disk Winchester disk drive technology, he added.



The Formation 4000 'Program-Equivalent Architecture'

Business Programming Language

In order to facilitate terminal-oriented systems, Formation has extended the capabilities of the VM/370 operating system by supplementing it with a Transaction Management System (TMS). TMS adds to VM/370 a business programming language similar to PL/I that works with a terminal monitor and data base management monitor.

Although the Formation 4000 is aimed at the OEM marketplace, it is being sold to large end-user organizations that seek to maintain control and compatibility of programs, data structures and procedures throughout an extended DP environment, Formation said. It ranges in price from about $52,000 to $150,000, depending on performance capabilities and peripherals.

First shipments of the Formation 4000 are scheduled for August, the vendor said from 823 E. Gate Drive, Mt. Laurel, N.J. 08057.

Portable Micro: Diskettes or Bubbles

LOS ANGELES — Findex has unveiled a portable microcomputer-based business system that features up to 400K bytes of built-in floppy diskette storage or 128K bytes of nonvolatile bubble memory mass storage.

The Findex 100TD and 128TD both feature a Z80 MPU, and 80- to 132-column built-in plain paper printer, a 72-key keyboard, a flat gas plasma display panel and four RS-232C ports. However, the 128TD has an expandable bubble memory while the 100TD has minifloppy disk drive storage.

The bubble memory can be boosted up to 2M bytes on the same controller and retains data even during power interruptions, a spokesman said.

The entire unit weighs about 31 lbs and can be operated on an optional backup battery. The MPU contains a software interrupt settable and readable real-time clock and 48K bytes of random-access memory. The unit also has 8K bytes of read-only memory expandable to 32K bytes.

Plasma Display

The system's plasma display can handle six rows of 40 or 80 char. each, numeric and upper/lower case alpha, and incorporates microprogrammed cursor and scroll protocols. The unit can be interfaced to full-sized CRTs to display a greater amount of data.

The printer operates at about 25 line/min, utilizes tractor and/or friction-feed mechanisms and can accommodate multicopy paper, the spokesman said.

For communications, the computer has the four RS-232C serial I/O ports, one of which is also a teletypewriter connecter. In addition, the system has 64 TTL parallel I/O lines, each of which can be used either in an input or output mode.

An optional acoustic coupler transmits information back to a central site at 300 bit/-sec or higher transmission rates.

The computer uses Digital Research, Inc.'s CP/M operating system and can function in Basic, Cobol or Fortran languages.

Aimed at small- and medium-sized businesses that need a portable business computer system, the 100TD is priced at $5,980 and the 128TD at $8,990. The additional 400K bytes of floppy disk storage costs $850 and extra 128K-byte bubble memory modules are priced at about $3,000 each.

Two-year lease/purchase rates on the computer and optional equipment are available, Findex said from Suite 808, 1625 W. Olympic Blvd., Los Angeles, Calif. 90015.

PCC 2000 Gains Enhancements — But There's a Slight Catch

LOS ANGELES — Pertec Computer Corp. (PCC) has announced a multi-tasking operating system, hard disk expansion options and a word processing software package for its PCC 2000 small business computer — but only two of the three products are available in the U.S.

MT2 is the international version of Pertec's MTX operating system that was introduced to domestic buyers last year. Both are multiterminal, multitasking systems with similar capabilities and include a disk-based reentrant Basic compiler, link editor and utilities.

But MT2 is not for sale in the U.S., and international prices vary according to currency exchange rates, customs duties and dealer/distributor enhancements, the company said. The MTX operating system carries a suggested price of $1,000 in the U.S.

PCC's hard disk options, available both in the U.S. and overseas, can add up to 80M bytes of fixed and removable storage for the PCC 2000. Each hard disk drive contains either two or four 5M-byte platters. One platter in each drive is removable, and the others are fixed.

The drives can be added in 10M- or 20M-byte increments to the PCC 2000's 1.2M bytes of built-in floppy disk storage. Additional 10M-byte increments cost $10,325 each; 20M-byte increments cost $13,325 each.

The word processing software package, Compu-Word, is part of a Human Resource Management Information System (HRMIS) for the PCC 2000. Both Compu-word and HRMIS were developed by XXCAL, Inc., a PCC dealership here.

Compu-Word is written in Basic and operates under Pertec's MTX operating system. It permits the preparation of text for letters and documents with paragraph, sentence and phrase insertion for repetitive work.

Compu-Word is available direct from XXCAL for a suggested price of $2,500. A complete hardware/software package that includes HRMIS/Compu-Word, a PCC 2000 with a 1.2-byte diskette storage unit, Nippon Electric Co. printer and a Basic compiler sells for $17,750, XXCAL said.

PCC is located at 12910 Culver Blvd., Los Angeles, Calif. 90066. XXCAL is at 11704 Wilshire Blvd., Los Angeles, Calif. 90025.

DEC 285 Line/Min Printer Features Prom Band Control

MAYNARD, Mass. — Digital Equipment Corp. has introduced a 285 line/-min band printer that features programmable read-only memory (Prom) band control and self-diagnostics.

The LP25 is priced about 39% lower than its predecessor, the LP05 drum printer, according to a DEC spokesman. It is available in two models: the LP25-AA, which has an Ascii 64-char. set, and the LP25-BA, which can handle an optional 96-char. set.

Band control within each printer model is carried out by map Proms. Up to three map Proms can be co-resident, the spokesman said.

The LP25-BA has user-replaceable fonts. Both units can be fitted with optional bands that print lines of 15 char./in. rather than the standard 10 char./sec.

The latter feature allows the printer output formats to be printed on 8.5-in.-wide papers, DEC said.

Additional bands for European and Japanese character sets are available as options.

Both printers have a universal power supply that is jumper-plug adjustable. Internally-generated diagnostic readouts reportedly enable a 30% reduction in maintenance costs compared with the earlier LP05 printer.

DEC is in Maynard, Mass. 01754.

Disk Drives Offer Byte Parallel Recording

LOS ANGELES — E.&U. Engel Consulting has introduced a line of 8-in. and 14-in/ head-per-track disk drives that feature one-word-length parallel recording and were designed to deliver bulk main memory storage to small business systems.

Like the older Univac 1103 and 1107 computers, the Disk-Ram drives permit random access to all individually stored words, exactly like a core or solid-state random-access memory, a company spokesman explained. The maximum formatted data capacity for the standard 8-in. drive is four million data bytes; for the 14-in. drive, it is eight million bytes.

The 8-in. and 14-in. drives have transfer rates of 1.8 million or 3.6 million byte/sec, respectively, matching the speeds of such microcomputers as the 8080 and Z80, the vendor said.

Access Times

The maximum access times are 17 msec and 34 msec, depending on the rotational speed of the disk spindle.

Scheduled for delivery in the third quarter, a typical 1M-byte disk drive with S-100 bus interface controller costs $995 from the company at 1719 S. Carmelina Ave., Los Angeles, Calif. 90025.

Tape Drive Runs At 75 In./Sec

SANTA ANA, Calif. — Basic/Four Corp. has unveiled a dual-density magnetic tape drive for disk data backup and off-line data storage.

The series 6500 is a 75 in./sec, 9-track vacuum column unit with a transfer speed of 120K byte/sec, the vendor said.

The drive records in either 800 bit/in. NRZ1 or 1,600 bit/in. phase-encoded (PE) formats on .5-in. magnetic tape. Up to 10.5-in. reels can be used on the Series 6500, providing a formatted capacity of 35M bytes or more on a 2,400-ft reel, the company said.

Target Systems

The drive can be used with the Basic/Four Systems 200, 410, 610, and 730.

It can also be employed between Basic/Four systems and those of other manufacturers who adhere to the Ansi standard for NRZI and PE recording formats, the company added.

The price of the Series 6500 is $16,500. The vendor can be reached at P.O. Box C-11921, Santa Ana, Calif. 92711.

Slide Rule Free

STAMFORD, Conn. — Digital Associates Corp. has a hand-held slide rule that provides condensed specifications of all the firm's medium-and high-speed line printers.

Offered free, the slide rule details print speed, line length, print coding, line spacing and other facts that might be pertinent to the user.

The paper slide rule can be obtained by writing on letterhead stationery to Digital Associates, 1039 E. Main St., Stamford, Conn. 06902.

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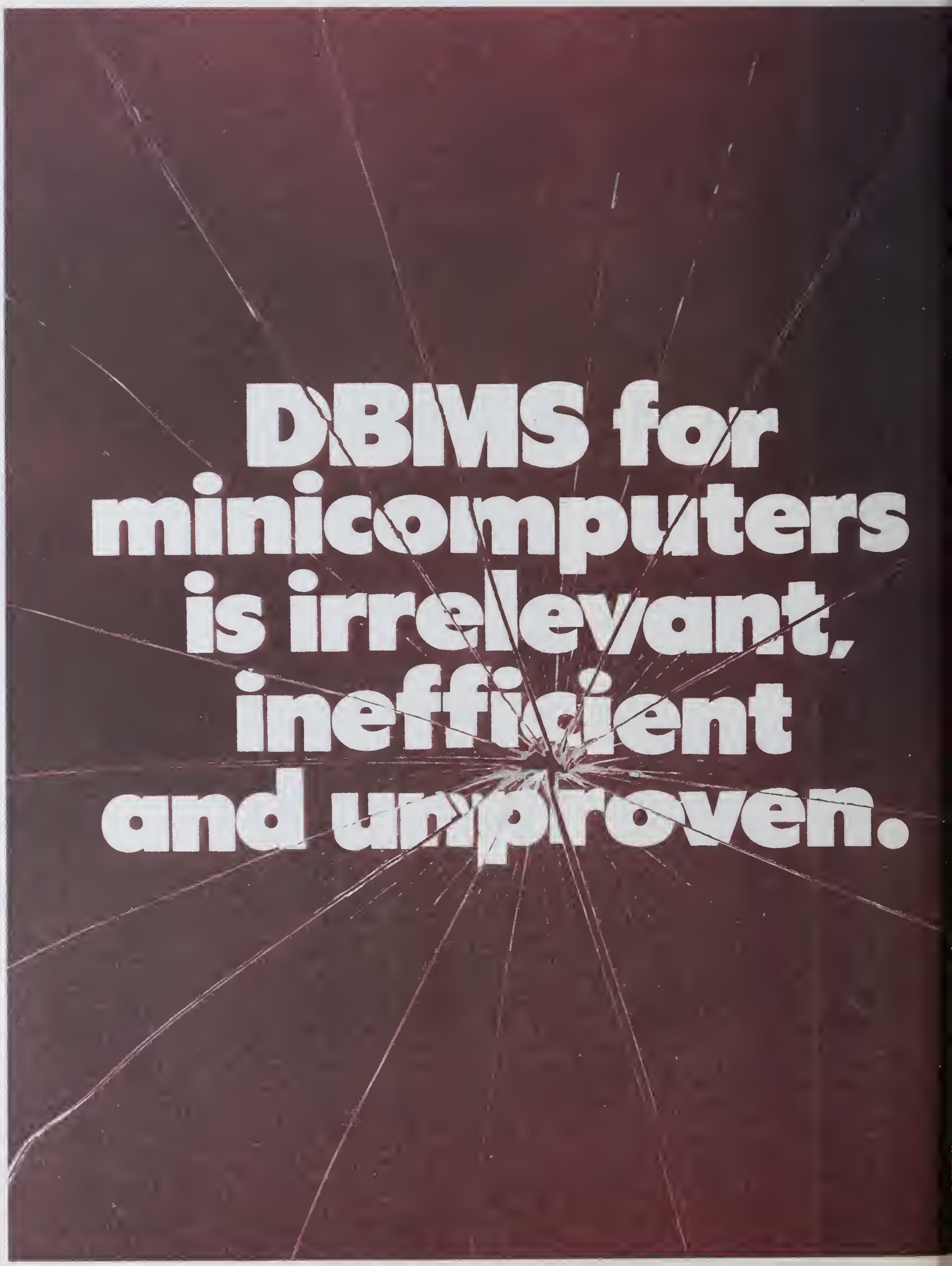

For Special-Education Publisher

Small System Proves Itself as Marketing Tool

Special to CW

BELLEVUE, Wash. — Edmark Associates, a special-education publisher here, originally bought a small business computer to handle its accounting, order entry and other standard administrative chores. But the company soon found out the system is capable of wearing a lot of other DP hats.

Edmark not only uses its Hewlett-Packard Co. 250 minicomputer for bookkeeping duties, but also uses it as a marketing tool. In fact, Edmark's president, Gordon B. Bleil, believes the computer is directly contributing to the firm's growth rate, which has been as high as 42% per quarter.

"By using the data base management and query capabilities of the HP 250, our sales personnel can get tailored, up-to-date lists — even on the spur of the moment — of potential customers for particular products in specific areas of the country," Bleil said. Edmark's data base of 25,000 actual and potential customers covers some 18 countries.

Although Edmark now has an established client base of teachers and educators, the company's first efforts at distribution relied heavily on direct mail, which involved several thousand mailings a month. The firm tried all sorts of manual systems to keep up with the workflow, but couldn't keep track of the number of responses that came in each day.

A service bureau was hired, but it proved unable to provide much flexibility in producing ad hoc reports, Bleil recalled. "As a result, all the reports had to be planned well in advance and had to be structured for a maximum of information. So we were getting a lot of information that we just couldn't use," he said.

Two-Year Search

When the service bureau bill became high enough that Edmark could justify installing its own computer, the publisher began a two-year search for the right machine. It considered offerings from Univac, IBM, Wang Laboratories, Inc. and Digital Equipment Corp., but opted for the HP 250, which had just been introduced.

Gordon B. Bliel, Edmark Associates president, and Tom Korten, marketing director, discuss work roster as it is output by HP 250 minicomputer.

"Some vendors told us the HP 250 would be too powerful for our needs. As a result, we almost ended up getting a system that was not powerful enough," Bleil pointed out.

Edmark decided on the HP 250 because of its Image/Query data base management system, which allows the input, organization and access of data in almost any format desired. The system is configured with a dual platter hard disk for a total of 20M bytes of storage and a floppy disk with 1.2M byte of storage. A 180 char/sec printer handles all reports and mail labels.

Marketing First

Aside from the development of the bulk of the order entry system, one of the first systems Edmark developed was a marketing support system.

To create the customer data base, the firm went through its customer records going back 10 years, analyzed all sales information and put the essential information in a coded format in the front of each file. Everyone in the office then had a daily 90-minute shift to key this information into the computer using CRT forms created with the help of the forms utility. The job was completed within 90 days, with no interruption to the regular work, Bleil said.

Simultaneously, programs were written in Basic by outside programmers for the standard types of functions and reports that the publisher needed.

The marketing data base can be used in several different ways. If a salesperson knows he is going into a particular area, he can simply access all previous customers in that area, generating a "work roster" list.

If Edmark comes out with a new

(Continued on Page 66)

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All of Mexico's computer equipment is imported; with the largest share coming from the United States. Half of Mexico's general purpose computer systems are made in the U.S., as are 20% of its minicomputers.

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From Emulex

PDP-11/70 Gets Controllers For 6,250 Bit/In. Formats

SANTA ANA, Calif. — Emulex Corp. has introduced two software-transparent, microprogrammed controllers for the Digital Equipment Corp. PDP-11/70 minicomputer.

The TC70 family interfaces directly to the internal cache bus of the PDP-11/70 and emulates DEC's TM03/TU45 magnetic tape controller for handling the 6,250 bit/in. group code replacement (GCR) recording format, the company said.

With applicable formatters, the TC70/A also supports the Telex 6240 and 6250 and the TC70/B supports the Storage Technology Corp. 1921, 1951 and 1953 tape transports.

A third version, not yet available, will support the Pertec Computer Corp. T1000 transport and formatter, the company indicated.

When combined with either tape transport and formatter, both the TC70/A and TC70/B controllers emulate either the DEC TWU 45 or TWU 77 tape subsystems. Both versions accommodate all tape speeds and recording densities handled by the applicable formatter — at speeds up to 125 in./sec and at densities of 800-, 1,600- or 6,250 bit/in., Emulex said.

First deliveries of the TC70/A and TC70/B are scheduled for June. Each carries a price tag of $7,950; in quantities of 50 or more, each costs $6,000, the company said from 2001 E. Deere Ave., Santa Ana, Calif. 92705.

S-100 MPUs Get 64K RAM Card

WESTLAKE VILLAGE, Calif. — Chrislin Industries, Inc. has introduced a dynamic random-access memory (RAM) module for S-100 bus microcomputers that offers 64K bytes and was designed to plug directly into the MPU's slot.

The CI-S100 memory module reportedly requires no wait states at 2 MHz or 4 MHz and can be expanded to 512K bytes with a bank select feature, allowing the user to select up to eight 64K-byte memory cards.

The module is addressable in 4K increments up to 512K bytes and is available with a battery backup. It costs $750 from Chrislin at No. 2, 31352 Via Colinas, Westlake Village, Calif. 91361.

Unit Lets Users Configure Mix of WP, DP Printers

SAN RAFAEL, Calif. — A four-board interface that allows letter-quality printers to be mixed with high-speed line printers in the same microcomputer or minicomputer configuration has been introduced by Micropro International Corp.

The S-100 I/O Master links Diablo Systems, Inc., Qume Corp. and other word processing (WP)-oriented printers with Centronics Data Computer Corp.-type printers in the same computer system. The unit features two serial and two parallel ports as well as an eight-level interrupt control and dual interval timer circuitry, a spokesman noted.

To ensure that keystrokes and transmitted communications data are not lost during disk I/O and task-switching operations, the device's two serial ports each have built-in 32-character first-in/first-out (Fifo) buffers. In addition, all of the board's options are switch-selectable.

I/O Master costs $400 from Micropro at 1299 Fourth St., San Rafael, Calif. 94901.

Mini Proves Marketing Aid For Washington Publisher

(Continued from Page 65)

product that is somehow related to products previously sold, the salesperson can access the data base by the old product number and create a work roster of all schools in a particular area that purchased that product and when.

Since the work roster list is printed using the HP printer's compressed mode, the list can fit on 8.5- by 11-in. paper instead of the usually bulky computer printout. The salesperson can thus easily take the work roster with him into the field and update it as necessary.

While some lists are created using prewritten programs in Basic, Edmark uses Query, HP's English language inquiry software, to look at data from different angles and generate work rosters before committing sales resources. "Once we have a list we like," Bleil noted, "we can use it to generate mail labels at the rate of 3,500 an hour."

Bleil also uses the computer as an accountability tool. When sales personnel go out into the field or to a trade show, they report all their activity and expenses on the same data base model as the marketing system.

Information on where they went, where money was spent and where orders actually resulted is fed into the computer. The company can determine whether a particular trip or trade show was worth the effort and use that informaton in planning future activities.

Edmark got into the special-education publishing business in 1972 with a basic reading program for mentally retarded children, who were at the time poorly served by public school systems, Bleil said. Currently, the firm publishes and distributes to educators more than 300 products that teach everything from reading and math skills to such basic skills as catching a bus and getting dressed.

Users Shopping Around

DDP Vendors See 8100 Delay a Boon

By Marcia Blumenthal

CW Staff

IBM's delay in getting its 8100 distributed processing system to perform as originally designed has stimulated user interest .in other vendors of distributed data processing (DDP) systems.

Despite that market opportunity, vendors interviewed recently aren't counting on IBM's problems lasting forever. Many are working diligently to develop such features for their DDP systems as Cobol compilers and increased IBM-compatible networking capability.

IBM has delayed the introduction of its 8100 Cobol compiler and has been pressed to get portions of its Distributed Processing Program Executive (DPPX) operating. Vendors reported that customers are getting impatient waiting for the 8100 and, in some cases, are becoming disenchanted with IBM's DDP offering.

Wait-and-See Attitude Seen

"We are finding that some of our customers are placing orders with IBM for one 8130 and one 8140 to try them out," according to Vaughn Hysinger, director of software marketing at Four-Phase Systems, Inc. Customers are taking a wait-and-see attitude rather than jumping on the 8100 bandwagon, he suggested.

Four-Phase's 460 and 465 systems introduced during the second quarter last year, are roughly competitive with IBM's 8100. However, Hysinger claimed his firm does not frequently come up against the 8100 in selling situations.

Although the company is not competing directly with the 8100, one of Four-Phase's basic strategies has been to achieve full compatibility with IBM's communications protocols. This is, in fact, the strategy being followed by most of IBM's competitors.

Four-Phase's products support IBM's Binary Synchronous and Synchronous Data Link Control line (SDLC) protocols for the IBM 3270 and 3277 CRT terminals. "In general we are equal to what our competition has, but we have something less than the full IBM repertoire. For example, we don't have multiple logical units for 3274s, 3276s and 3278's" Hysinger said.

On the other hand, Four-Phase does have a Cobol compiler, and the system can perform source data entry functions, which Hysinger claimed IBM won't have until the end of this year.

While he was reluctant to speculate at great length about IBM's problems with the 8100, he did say the loop concept on the 8100 architecture causes the operating system to run at the speed of the slowest device attached to that loop. In addition, he has heard that programmers returning from a DPPX workshop complained that the time it takes to assemble and run programs is not as fast as they would like.

Response Time Criticized

Another criticism of the 8100, offered by a source who requested anonymity, involves

(Continued on Page 72)

Amdahl Gets Tran by Merger, Breaks Into Telecommunications

SUNNYVALE, Calif. — Amdahl Corp. appears to have finally broken into the digital communications arena with the acquisition of Tran Telecommunications Corp., a privately held company based in Marina Del Rey, Calif.

Under the terms of a merger agreement, Amdahl will issue up to 1.35 million shares of its common stock in exchange for all the common shares of Tran. The merger is valued at approximately $25 million to $28 million, stemming from Tran's assets, an Amdahl spokesman noted.

Merger discussions took place over the last several months. Already agreed to by both companies' boards of directors, the transaction is subject only to the approval of Tran's shareholders and will probably be finalized the end of May.

This marks the third and only successful attempt by Amdahl to acquire another company. Previously, the hardware vendor had tried to acquire Memorex Corp. and also Comten, Inc. — acquired by NCR Corp. last year — but negotiations with both companies fell through.

"With Tran, Amdahl will provide an alternative for digital communications that serves the essential data communications requirements for large-scale system users," John C. Lewis, Amdahl president, stated.

Tran will operate as a wholly owned subsidiary, acting independently of Amdahl in supporting its customer base. An Amdahl spokesman noted, however, that Amdahl's, customers would be interested in Tran's capabilities, and marketing strategies would be formulated accordingly.

Tran, which earned $22 million in 1979, is engaged in the design and manufacture of digital communications networks that support the CCITT X.25 standard and are not restricted to specific manufacturers' protocols. Its equipment is currently installed both domestically and internationally and is manufactured in Canada and Italy as well as in California.

Trade Surplus $4 Billion

WASHINGTON, D.C. — U.S. manufacturers of computers and business-related equipment scored a trade surplus of more than $4 billion during 1979, according to statistics provided by the Computer and Business Equipment Manufacturers Association (Cbema).

While imports of this equipment increased by 12% over 1978 levels and reached $2.54 billion, overall exports climbed by 28%, reaching a record $6.56 billion. During 1978, the trade surplus totaled $2.87 billion.

Exports of computers and related equipment, including parts, made up $5.35 billion of 1979's total exports, up 27.8% from 1978 trade levels, according to Cbema.

The trade association noted that the growth of exports was particularly strong in the final quarter of last year, with the ratio of excess of exports to imports 2.80 for the quarter. For the year, that ratio was 2.58.

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By Enhancing Desktop Systems

ISC Moves Into Small Business Systems Mart

By Marcia Blumenthal
CW Staff

ATLANTA — By enhancing its Series 8000 desk top computers with business software, Intelligent Systems Corp. (ISC) has moved into the small business systems market.

What makes ISC's system unique is its color graphics accounting capability, Peter J. Curnin, president and chief executive officer, claimed.

Curnin recently joined ISC after a 23-year career with IBM Corp. While at IBM one of his assignments was project director and marketing strategist for the 5100 system.

ISC, founded in 1973, has built its reputation on its color graphics CRT monitors, which is integral to all its desktop systems.

However, until now the firm has specialized in color graphics for process control, energy management and management information applications. The firm claims to have a 30% market share in the color graphics market.

Licensing Agreements

Adapting its existing system to the small business environment was achieved primarily through licensing agreements with three software vendors.

ISC has incorporated the CP/M operating system developed by Digital Research, Inc. into its system.

In addition, it has signed an agreement with Microsoft, Inc. for unlimited distribution rights to its Business Basic, Fortran IV and Cobol languages, which are enhanced to include color graphics. Basic is the standard language on the ISC system.

A third agreement is for Peachtree software developed by Retail Sciences, Inc., which makes business packages available to ISC's CP/M dealers and distributors.

In marketing its small business system, ISC will use its current network of 120 marketing representatives. These reps will seek out local software and systems houses qualified to carry the product line.

Because of the exclusivity of ISC's color graphics accounting capability, Curnin thinks the firm will be able to attract a substantial number of high-caliber vendors. ISC will provide vendors training in modifying their application packages to include color graphics.

Product Competition

Today vendors are looking for a unique product, Curnin maintained. They see their own suppliers opening retail outlets in direct competition with their businesses. These vendors are also competing with many other vendors who carry the same product line.

As far as competition from IBM's 5100 series is concerned, Curnin claimed IBM's seminars to acquaint potential users with the system yield only one sale in 39 prospects.

"Customers want an installed system, but IBM doesn't do that," he maintained. On the other hand, software and systems houses are willing to provide the hand-holding service.

Six Models

The CP/M-compatible desktop systems, ISC's models 8063, 8064, 8363, 8364, 8963 and 8964, are equipped with 32K bytes of user random-access memory, expandable to 48K, and 8K bytes of read-only memory.

Screens come in 13-in., 19-in. or 25-in. sizes. Storage for the system is a 591K-byte dual 8-in. floppy disk drive or a 1.1M-byte dual 8-in. double-headed floppy disk drive.

In addition, ISC intends to configure the system with an 8-in. Winchester drive in the near future.

The price of the color graphics accounting system, including the CPU, display, storage, printer and software, is between $7,800 and $9,800.

Curnin considers the system's closest competitors the IBM 5100 series and the PDP-8-based equipment sold in Digital Equipment Corp.'s stores. These systems are priced between $9,000 and $13,000 and neither currently has color graphics.

By expanding into the small business market, ISC expects to boost its sales $2 million next year, Curnin noted.

For its latest fiscal year ending today, ISC projects revenues of $15 million.

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An additional feature is the head per track storage option. This option adds 8 fixed heads on the bottom surface to yield 136k bytes of high speed disk storage. This improves throughput but reduces seek time on frequently accessed files or directories

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Ireland's O'Malley Reports:

U.S. Firms Investing in Ireland

Marcia Blumenthal
CW Staff

SAN FRANCISCO — During his week-long visit to California recently, Desmond O'Malley — Ireland's Minister for Industry, Commerce and Tourism — announced that seven U.S. companies will invest more than $100 million in new or expanded plants in Ireland.

Heavily targeting both Silicon Valley and southern California on his tour, O'Malley disclosed that in the near future he expects several computer-related firms to announce plans to invest in Ireland.

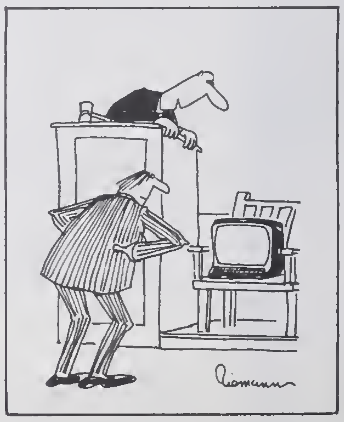
Three of the seven firms committed to new investment in Ireland produce products for the computer industry. These three companies are Prime Computer, Inc., Digital Equipment Corp. and Soroc Technology, Inc.

Prime's operation will be developed in two stages. Initial production of Prime's small and medium-size systems will take place at a 40,000 sq ft temporary facility in Santry, outside of Dublin. A second permanent plant of 144,000 sq ft will be completed in 1981.

Initially, the new plant will configure and test Prime 100, 200 and 300 systems and will eventually phase in production of its 400 system and its newer 50 series systems.

DEC, which already employs 1,000 people in Galway, will start construction shortly on a new 150,000 sq ft plant at Clonmel. Scheduled for completion at the end of next year, the plant will employ 450 people within five years, O'Malley reported.

In addition, Soroc Technology, a terminals maker that already has two plants in Anaheim, Calif., will establish a 22,000 sq ft plant in Westport, County Mayo.



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PERKIN-ELMER

Despite State of the Economy

Author Sees Bright Future for DP Electronics

By Jeffry Beeler
CW West Coast Bureau

SANTA CLARA, Calif. — Although hard times almost certainly lie ahead for the U.S. business community as a whole, the future looks comparatively bright for the economy's computer equipment and semiconductor sectors, according to economist and best-selling author Paul Erdman.

"Recent history has shown the electronics field to be the exception to almost every dour economic prognostication, and the industry's success is self-perpetuating," the author of the best-selling novel *The Crash of '79* said. "The electronics industry is unquestionably the U.S. business community's technological leader and is thus in a unique position to complete in the world-wide market."

The high-technology field's historically impressive level of performance will ensure its continuing access to the domestic equity market at a time when most other industries will find venture capital increasingly difficult to raise, Erdman predicted at the latest dinner meeting of the American Electronics Association.

Brightest Prospects

Economic prospects look especially rosy for electronics firms selling directly or indirectly to the U.S. military, the author explained. Such companies can look forward to a decade of increasingly brisk order rates as U.S. defense spending escalates to counter continued Soviet military expansion and to protect strategic American interests abroad, particularly the Middle East.

On the industrial side of the U.S. electronics business, the long-term economic outlook appears a "little less hopeful" than in the defense sector. On the whole, however, the future for industrial electronics suppliers still seems reasonably promising, Erdman said.

Only Threat of Pinch

Only on the consumer front is the high-technology field faced with the threat of a serious financial pinch.

> *'If we ever needed a recession, the time is now. If we don't get the expected recession this summer, the next oscillation in the U.S. economy will be wild and possibly very destructive.'*

"If I were in the consumer end of the electronics industry, I think I'd be more than a little concerned."

Continued high interest rates and restrictive monetary policies will act as a brake on consumer spending and thus hamper sales of home computor systems and other consumer-oriented electronic products, he explained.

Slackening Competition

On the international scene, Erdman sounded a fairly optimistic note for electronics firms concerned about the apparently growing danger of foreign competition. Many U.S. high-technology companies have identified their prime overseas competitor as Japan, but during the next three to five years the Japanese threat will slacken "significantly," the author said.

The prospect of American retaliation for Japan's allegedly unfair trading practices will make market conditions "very dicey for the Japanese and their exports," he added.

Another foreign competitor whose ability to penetrate the American electronics market will probably fade somewhat is West Germany. Until recently, German high-technology firms enjoyed a distinct advantage over some of their U.S. counterparts because of West Germany's strong currency and economy.

But during the last few weeks, the German mark has fallen 8% compared with the dollar, and West Germany's economy has suffered a "massive" balance-of-trade deficit, Erdman reported.

Carter 'Inept President'

Turning his attention to the U.S. economy in general, Erdman quoted Federal Reserve Chairman Arthur Burns as saying the nation today faces an economic plight as serious as the one that preceded the Great Depression of the 1930s. The speaker blamed "the mess we're in" on Jimmy Carter, who he described as "an inept President who doesn't understand the workings of the American monetary system."

Carter's latest actions on the financial front, he said, have increased to 50% the chances that the U.S. will suffer a recession starting sometime this summer. But Erdman sees the coming economic downturn as a possible blessing in disguise.

"If we ever needed a recession, the time is now," he said. "If we don't get the expected recession this summer, the next oscillation in the U.S. economy will be wild and possibly very destructive."

Two Scenarios

Looking ahead to the next 10 years, Erdman envisioned two possible scenarios for the U.S. economic future. In the first scenario, he predicted an extended period of double-digit inflation coupled with negligible economic growth.

The second scenario is the less probable but the far more frightenting of the two. In it, Erdman described how a single international incident could topple the world monetary system and result in a "massive outflow" of funds from U.S. hands into foreign financial institutions.

Such an economic catastrophe, whose chances of happening currently stand at as high as 35%, could be triggered, for example, by a revolution in Saudi Arabia and the emergence of hard-line leftist regime in that traditionally pro-western Arab state, Erdman said.

Qume Regroups Lines Into Three Divisions

SAN JOSE, Calif. — Qume Corp. has regrouped its product lines into three segments in order to cope with the growing demand from the office automation and data processing fields, according to the firm. The groups are printer products, memory products and supplies.

Stephen R. Bowling, former vice-president of finance, was appointed to head the Printer Products Division and Stephen N. Berkeley was appointed to head the Memory Products Group.

The Supply Division manager has yet to be announced.

Lee to Continue

David Lee, executive vice-president and one of Qume's founders, will continue to direct engineering and research on all current and new product developments.

Qume is a subsidiary of International Telephone and Telegraph Corp. and a unit of its Business Systems/-Communications Group. Previously a manufacturer of daisy-wheel character printers and associated accessories.

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Seminar Probes Depth of Japanese Threat to U.S.

By Connie Winkler
CW Staff

NEW YORK — Has Japan's computer industry been targeted for such concerted growth that American manufacturers should be worried?

There was no agreement on this complicated question, but many sides of the argument were presented at a recent seminar that compared Japanese and U.S. positions in high-technology industries. The seminar was sponsored by the Japan Society, Inc. here.

Thinking that Japan has targeted the semiconductor and computer industries is outdated and shows a lack of judgment, according to panelist W. Andrew Osterman, an international economist with the Bureau of East Asian Affairs in the U.S. State Department's Office of Economic Policy. Acknowledging this might have been the thinking of three to five years ago, he stated it is not true today.

Keiske Yawata, who is with the Overseas Operations Group of Nippon Electric Co., agreed there is no targeting and no one large Japanese company like IBM. Japanese companies may be coordinated on research and development activities, but not on business, he said.

"Japanese companies derive their strength from fierce competition in their domestic market," moderator James Abegglen, vice-president of the Boston Consulting Group, explained, noting these same arguments come up in discussions on autos and steel. "It's a misconception that they connive with each other."

'Yes' to Targeting

But Norihiko Nakayama and others in the audience of about 100, however, thought Japan has nationally targeted industries.

"Like the U.S. put a man on the moon, in Japan there is wide agreement that certain projects and industries are so important they are target industries. The Japanese government promotes and stimulates . . . development with subsidies," Nakayama said. The money comes from private banks, however, the president of Fujitsu (America), Inc. and a director of Amdahl Corp added.

By further explanation, he called the computer industry a "money-eating insect" to underscore the capital intensiveness of the computer industry and why it needs so much support. Nakayama also called for more joint ventures between American and Japanese companies.

The great demand for capital threaded through the other speakers presentations. Whereas it formerly took 30 cents to 35 cents increase in investment for every $1 increase in revenue within the semiconductor industry, it now takes $1 or more to make $1, Ming Li, senior electronics analyst with Bear Stearns & Co., said.

Small, independent semiconductor houses are going to have a difficult time surviving, and there will be additional consolidation, he predicted.

Li also suggested that other U.S. "backward integrated" companies — those in the computer industry and moving into semiconductors — will have limited success.

The downward integration of Japanese electronics companies (in contrast to stand-alone semiconductor houses) has been a factor to their success, Yawata said. Electronics companies have used their system designers and technological and financial experts in the semiconductor area.

Erich Bloch, vice-president of IBM's Data Systems Division and general manager of the East Fishkill, N.Y., semiconductor facility, agreed that "backward integration" has not been successful to date, but stressed it will change in the future.

"With [very large-scale integration], it is essential for computer manufacturers to have semiconductor capability in-house . . . because of semiconductor value added," Bloch said. He foresees greater merging of the semiconductor and computer industries.

Bloch observed that the U.S. lead in semiconductors is disappearing: "I believe we are in the middle of a development cycle. To remain successful we must combine new research and development with a manufacturing base."

IBM will continue to buy standard chips on the open market, Bloch said, but produce more proprietary chips internally.

Three-Part Recipe

To maintain growth for both countries, William N. Sick, vice-president and general manager of Texas Instruments, Inc's. Materials & Electrical Products Group, set out a three-part recipe:

- Acceleration by the Japanese government of the removal of trade barriers.
- Stabilization of the U.S. economic house to fight inflation.
- More agressive pursuit of the Japanese market by the U.S. semiconductor industry.

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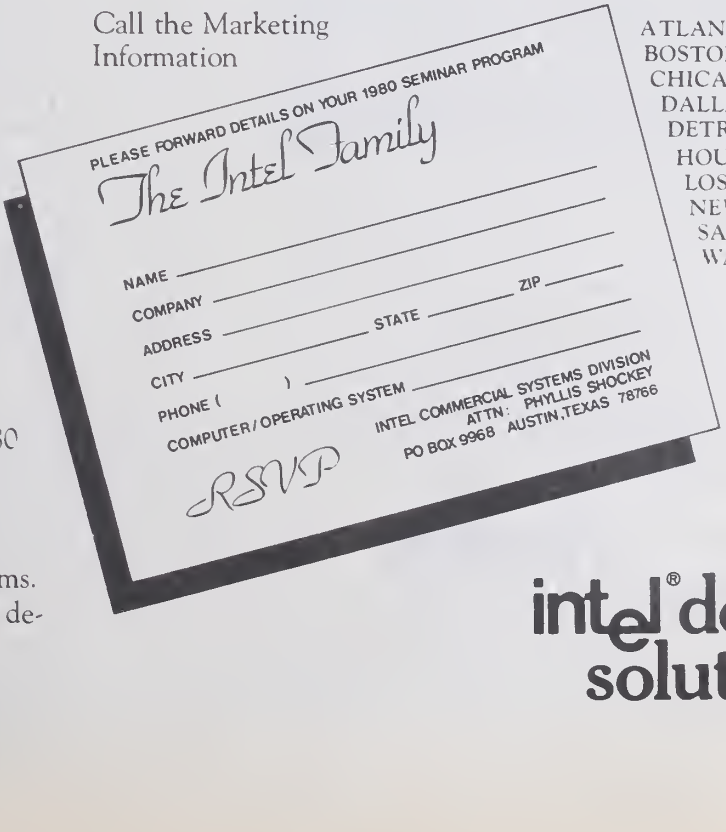
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Revenues Up 39%, Net 59% In National Semi's Quarter

SANTA CLARA, Calif. — National Semiconductor Corp. reported a 39% increase in revenues and a 59% increase in earnings for its third quarter.

Quarter revenues reached $230 million compared with $165.7 million in the same period last year. Earnings climbed to $12.3 million or 60 cents per share from the $7.8 million or 39 cents per share reported in the year-ago quarter.

For the year to date, National Semi reported revenues of $679.3 million, up from $518.7 million a year ago. Earnings for the nine months totaled $35.9 million or $1.77 per share, a 45% increase from the $24.6 million or $1.24 earned in the same three quarters last year.

All earnings figures reflect adjustment for a three-for-two stock split on March 19.

Commenting on the company's financial performance, National Semi President Charles E. Sporck noted the firm has continued its high rate of product introductions. "We delivered the first samples of our 32K MOS electrically programmable read-only memory as well as our 256K bubble memory," he said.

Also announced during the last quarter was the firm's 16-bit multiprocessor family, the NS16000.

Sporck also noted that the result from National Advanced Systems' sales and support operations were included in the company's consolidated financial statements beginning Jan. 1.

Users Getting Impatient With 8100: DDP Vendors

(Continued from Page 67)

the response time for transactions, which he understood is exceedingly slow — 2 sec to 4 sec in some cases. While the response time for one terminal is faster, the system was designed to have multiple terminals attached to it.

The degradation in response time in a multiterminal environment was also cited as an 8100 problem by Computer Automation, Inc. "We are finding customers are becoming disenchanted with the 8100 and looking for alternatives," Weldon Knape, marketing manager of CA's Commercial Systems Division, stated.

CA's Syfa DDP product specializes in transaction processing in a multitasking environment and utilizes both bisynchronous and SDLC protocols.

The firm does not plan to offer a Cobol compiler because Cobol is a batch-oriented language, Knape said. Instead, CA offers its proprietary language, Sybol, which is geared to transaction processing.

Keeping up with IBM's networking environment, CA introduced a 3790 programmable cluster controller about eight months ago.

While Knape was hesitant to discuss CA's upcoming communications products, he did say the firm is expanding the Syfa's raw power. In particular, the firm is concentrating on a virtual network based on the X.25 protocol.

This product was introduced in 1978, but ran into snags [CW, April 24, 1978]. However, it is now in Beta testing, Knape disclosed.

Nixdorf's Plans

Homing in on IBM's communications capabilities, Nixdorf Computer Corp. is on a fast track to make its 600/X5 distributed system compatible with standard IBM protocols. Right now Nixdorf has bisynchronous capability and is working on a Systems Network Architecture (SNA) emulator, according to Robert J. Leydon, product manager for DDP systems.

Nixdorf's system works in Editor language, but the vendor is developing a Cobol compiler which should be ready by the end of the year. "This will put us on a more equal footing with the 8100. The lack of the compiler could be viewed as a reason [for a user] not to consider Nixdorf," Leydon explained.

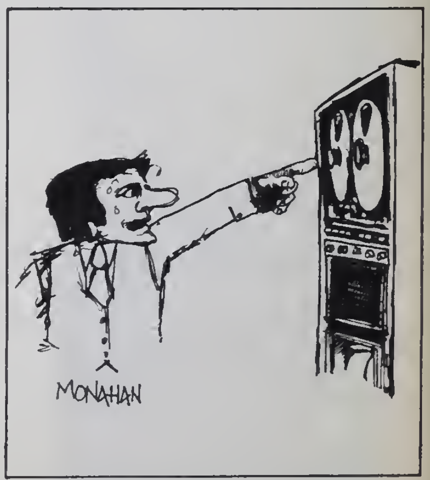
One of the most recent competitors jumping into the SNA environment was Digital Equipment Corp., which last month introduced its RSX-11M/-SNA protocol software [CW, Feb. 11]. This allows PDP-11s operating under the RSX-11 operating system to emulate SNA devices like IBM's 3790.

While IBM's delay getting its 8100 system running as designed is creating user interest in competitive vendors, Datapoint Corp.'s vice-president of corporate development, Gerry Cullen, has no doubt IBM will do what it said it would do with the 8100.

Anyone who builds a machine from the ground up, he noted, must expect delays: "When the 8100 came out, it was viewed as a magic machine. Users are now realizing it's not magic."

In particular, users with tight time schedules who originally planned on a DDP system based on the 8100 are looking to other vendors, he observed. "It gives Datapoint some time to build on the work we started in 1970.

As Four-Phase's Hysinger summed it up, "There was a lot of sizzle when IBM introduced the 8100, but the demand in the DDP arena is much larger than is evident from IBM's shipments to date."



'I'm Warning You . . . You Order Another Pizza Delivery Without My O.K., and It's Back to the Factory.'

Western Europe DDP Mart Seen Quadrupling

WALTHAM, Mass. — The Distributed Data Processing (DDP) market in Western Europe will expand from $189 million in 1979 to as much as $878 million in 1983 — more than a fourfold increase, according to a report by International Data Corp. (IDC).

The research study — part of IDC's Eurocast Series — predicted that DDP will become one of the leading growth areas in Western Europe, surpassing the general minicomputer, small business system and processing terminal equipment markets.

During 1979, minicomputers claimed the largest share of the European DDP market, but IDC researchers foresee a change in this structure occurring in the near future. A significant increase in shipments of processing terminals during 1980 and 1981 is also projected, which would result in those units dominating the market in terms of both dollar value and number of units.

Small business systems are expected to show an overall 16% market growth through 1980, but will still constitute the smallest revenue-earning segment of the West European market. Only 1% of all small business shipments will be used in a DDP environment in 1980, according to IDC.

Not Comparable

The report cautioned U.S. vendors against comparing the European market with the U.S. DDP market. The European market is not as homogeneous as that of the U.S., and different attitudes and trends are apparent in various countries there.

Standardization has been slow to develop. The West German market is still heavily geared to the small business system — an area where DDP is not strong. France's centralized processing policies have opposed the implementation of DDP, and in the UK reduced investments by much of the user base have slowed growth.

Despite the various problems, DDP will continue expanding, according to IDC, which interviewed many large system users about their future DP plans.

Also included in the report is a discussion on the overlapping effect of IBM's product lines. IBM, slow to realize the potential of DDP, is now fully committed to the market with its offering of the 4300, 8100, Series/1 and System/38, according to IDC.

The Eurocast report, "Distributed Data Processing 1979-1983," is based on interviews with both users and vendors throughout Western Europe. It costs $2,000 each or $9,500 for eight from IDC, 214 Third Ave., Waltham, Mass. 02254.

Electro/80 Set for May

EL SEGUNDO, Calif. — Applying high-technology electronics to "real world" needs will be the theme of the Electro/80 professional program.

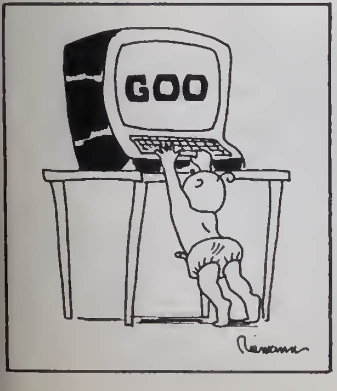
Scheduled for Boston May 13-15, Electro/80 will feature 34 sessions with a total of nearly 150 individual presentations.

Minicomputers, microprocessors and memory devices will be the main emphases of the professional program.

"The sessions will explore chip fabrication and utilization of the computer and will investigate the trade-offs between hardware and software," according to George Foyt of MIT's Lincoln Labs and Electro/80's program committee chairman.

The EEE-488 bus will be scrutinized, with sessions dedicated to fundamentals, case histories, communications and architecture.

All professional programs will be held at the Sheraton Boston Hotel. More information is available from Electro/80, 999 N. Sepulveda Blvd., El Segundo, Calif. 90245.



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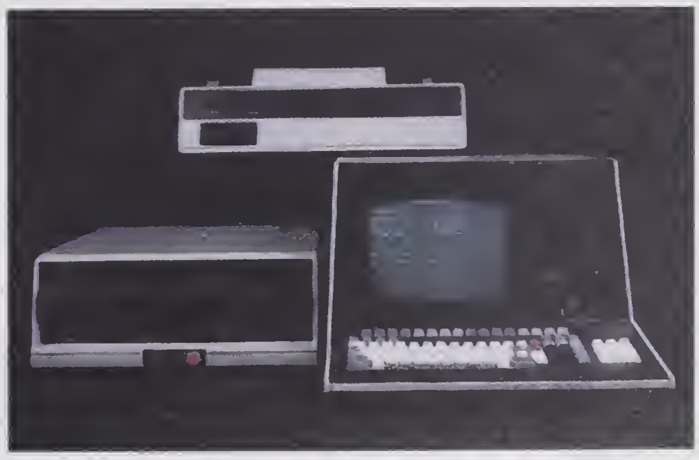

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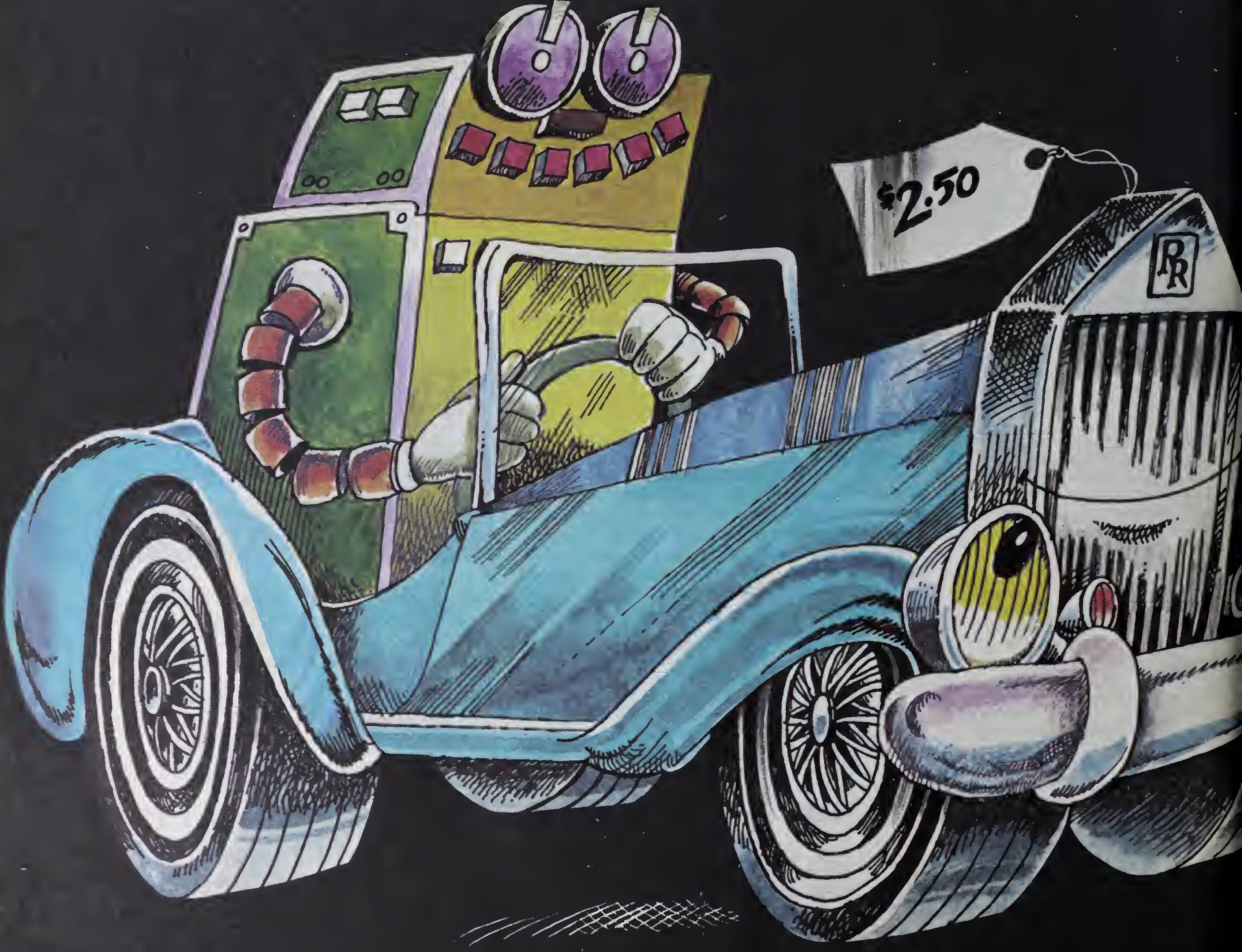

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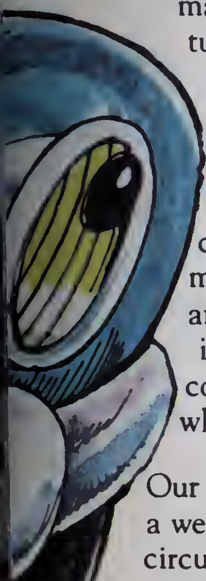
But as unbelievable as the last 30 years have been, the next 30 will probably be even more incredible. Right now, IBM has begun delivery of a new computer series that will, by itself, provide four times as much processing power as all the previous computers delivered by the company. And they have announced a new "superconductor" that could improve computer speed and performance by a factor of 500 in the next seven years! It's hard to remember this is real science, not fiction.



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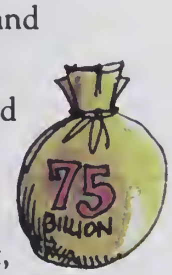

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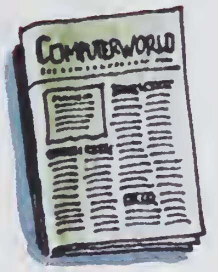

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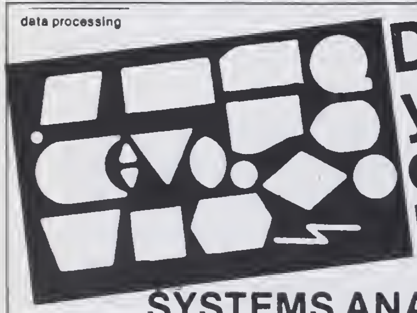

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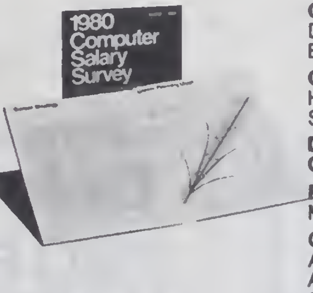

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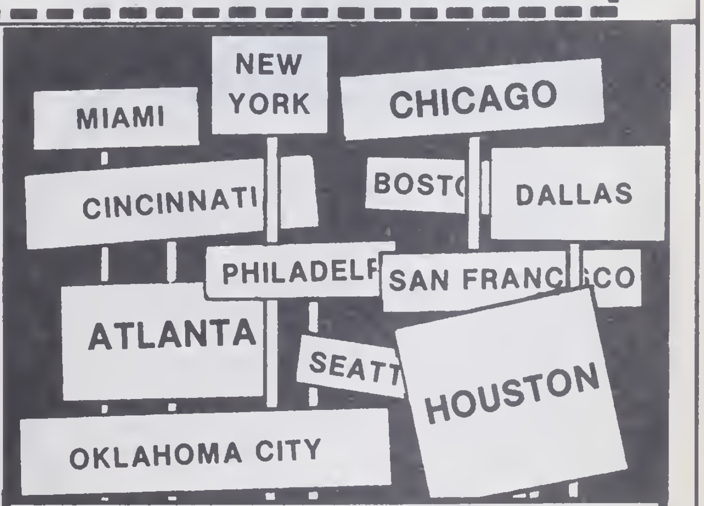

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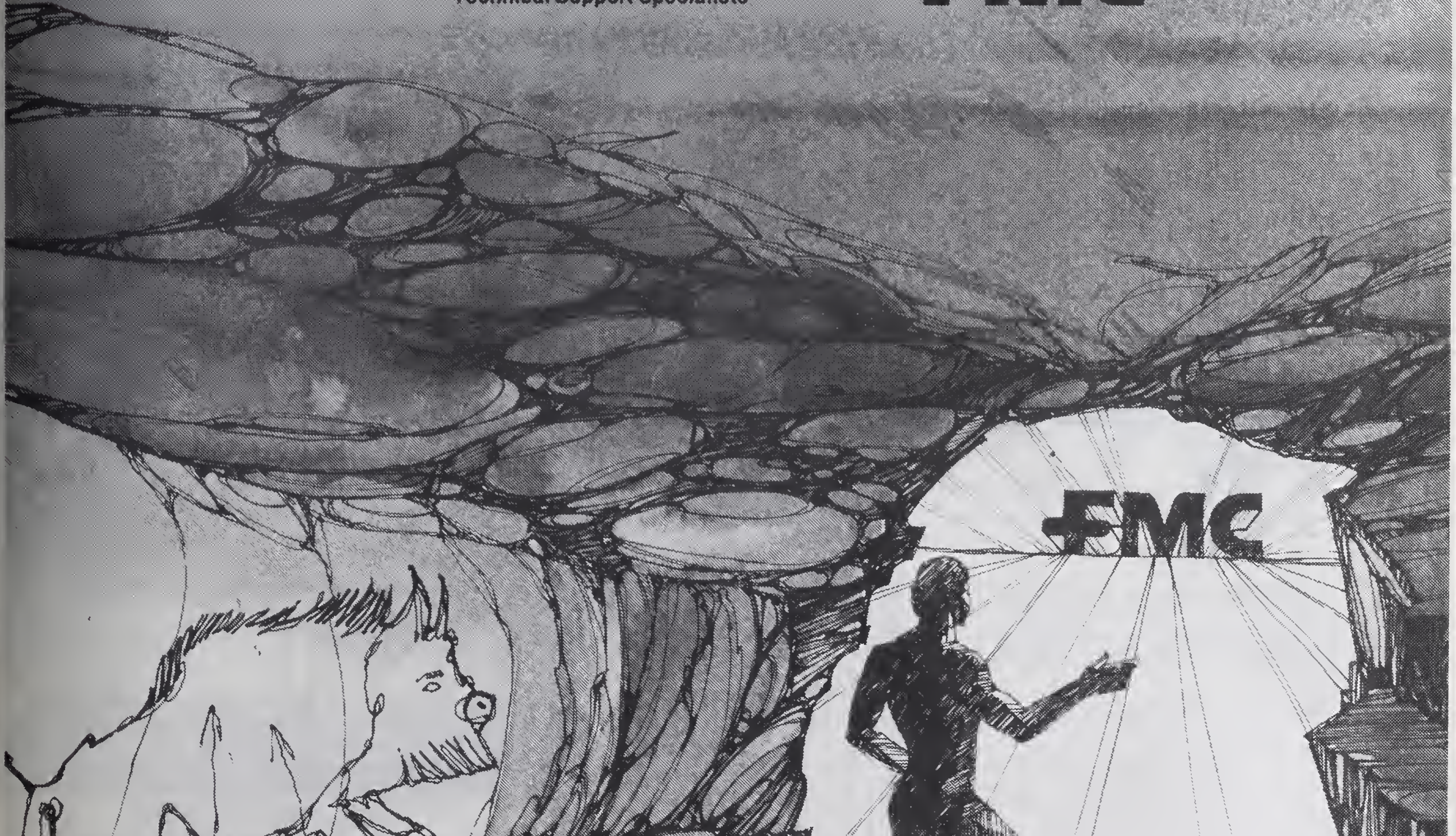

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Excellent upper level position for a shirt-sleeve DP professional. Heavy analysis and design with some programming and insurance applications experience in background. Develop expansion program for data center now remote to 370. Ground floor opportunity.

$32,000 FEE PAID

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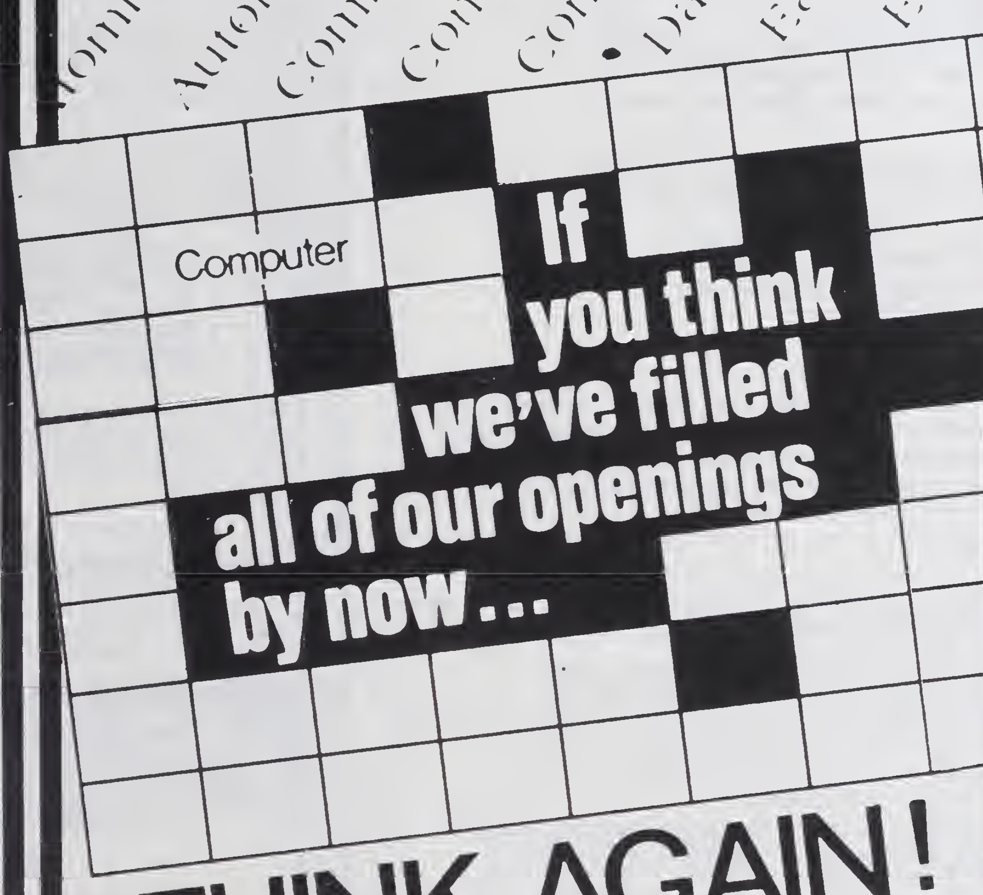

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If you think we've filled all of our openings by now...

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Computer Sciences Corporation is constantly looking for Electronic Data Processing Generalists, Specialists and Managers for a wide variety of projects. Our Applied Technology Division provides the finest programs and systems for many of the world's top Government and Industrial concerns. We are currently seeking professionals with knowledge of Image Processing, Communication Systems, Simulation Systems, Electronic Warfare, to name but a few challenging and rewarding disciplines.

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Please send your resume in confidence to:

Mary Janaitis
Employment Manager
Department C-324

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Major Offices and Facilities throughout the World
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PROGRAMMER/ ANALYST

252 bed Northern Rhode Island Hospital seeking programmer/analyst. NCR Criterion 8550. COBOL and NEAT/3. 3 years experience required, hospital experience preferred.

Excellent salary and benefits commensurate with experience and ability Interview by appointment only Submit resume in confidence to:

Personnel Office
c/o Richard Hornsby
Woonsocket Hospital
115 Cass Avenue
Woonsocket, RI 02895

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Applications are invited for a tenure-track, full-time undergraduate teaching position in computer science at assistant, associate, or full professor level. Salary dependent upon experience and qualifications, up to $29,000. Ph.D. in computer science required, knowledge in business and/or management applications of computer science preferred. Applications will be accepted until position is filled. Send vita, including unofficial transcripts, and letters of recommendation to **Computer Science Search Committee, Akeley 203, Lock Haven State College, Lock Haven, Pennsylvania 17745.** An affirmative action/equal opportunity employer

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ADMINISTRATIVE SYSTEMS MANAGER

Oneonta is one of several colleges of Arts & Science in the State University System. It is located 200 miles northwest of New York City. The student enrollment is approximately 6,200. Fringe benefits up to 29% of salary. The college is an Affirmative Action/Equal Opportunity Employer and encourages applciation from women and minorities.

To lead conversation,development and maintenance of SUNY college's administrative application. Reports to Director, Computer Services. Project leadership and supervisory experience in COBOL programming, systems analysis, telecommunications and data base required. Degree in appropriate discipline. Burroughs large systems and higher education application experience preferred, Salary: negotiable in mid 20's. **Send resume by April 18, 1980 to: Dr. Beverly E. Harrison, Affirmative Action Officer, Box CW.**

State University College
Oneonta, New York 13820

A **SENIOR SYSTEMS ANALYST** position is available in the Programming and Analysis section of the User Services group of West Virginia Network for Educational Telecomputing. Responsibilities include providing user support for batch and timesharing computing on an Amdahl 470 V/7A and other large scale systems at the host site and for minicomputer systems at remote sites Requirements: MS or BS in a Scientific or Business related field plus respectively 3 or 5 years work experience in programming or analysis; one year experience as a project leader (can be concurrent); demonstrated proficiency in at least 1 higher level language; demonstrated proficiency in problem solving, systems analysis, and design; Prior experience with large scale multiprogrammed computer systems; Good oral and written communication skills; Demonstrated ability to perform independent creative work; and a specialization in one of the following areas: Applied mathematics, applied statistics, operations research, engineering, computer service, arts and humanities, or administrative data processing. Salary open. **Apply by April 18, 1980** to **Judy Martin, WVNetwork, 837 Chestnut Ridge Road, Morgantown, WV 26505.**

Affirmative Action/
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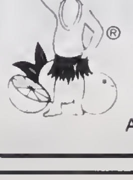
Florida's Gold Coast and Tropicana, the leader in the citrus processing industry, combine to create an exciting environment for an individual with technical support experience. Your systems design, business, accounting, or mathematics degree plus three or more years experience in technical support on Burroughs 6700, 6800, 7700, or comparable equipment could qualify you for this opportunity. The ability to handle D.M.S. II and M.C.P. as well as proficiency in related communication techniques and software are also required.

To further explore your career possibilities, forward resume in strictest confidence to M. Cutler, dept. 560.



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Software Talent: GO WITH US, GROW WITH US!

We're looking for brainy and ambitious computer professionals who'd like to find out how far their talents can take them.

As the developers of SyncSort – one of the fastest growing software programs in history – we offer outstanding opportunities for professional growth, financial advancement, and personal satisfaction.

You'll be joining a "leading-edge" software team. Most of our top people have been promoted from within. They've grown with us, and you'll grow, too, if you've got what it takes.

We offer excellent salaries and benefits, and a congenial, highly professional working environment. But most of all we offer you an opportunity to find out what's inside yourself.

We are now seeking:

SYSTEMS ENGINEERS, with excellent technical backgrounds, to conduct presentations and performance evaluations in major computer centers:

- At least two years' IBM systems experience with a desire to enter marketing;
- Knowledge of OS/VS or DOS/VS(E);
- Extensive travel rewarded with high earnings.

Call Dick Lyko or Bill Prinzivalli, (201) 568-9700, or send a confidential resume.

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- Exposure to OS or DOS internals;
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Call Ken Cooper, (201) 568-9700, or send a confidential resume.

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WHITLOW
COMPUTER SYSTEMS Inc. 560 Sylvan Ave., Englewood Cliffs, N.J. 07632

Data Processing Technical Marketing Specialists

General Electric Information Services Company, one of the world's leaders in remote computing services, has two immediate openings for Technical Marketing Specialists.

You will provide functional requirements to development organizations; evaluate new products and enhancements for systems or application software; participate in design review sessions; coordinate projects through development cycle; prepare or assist in preparation of technical documentation; provide technical consultation to other Marketing components.

To qualify, you should have at least three years' data processing experience with at least two years in an IBM Operating Systems environment. You should also have experience in one of these areas:

- Three to five years in data base management systems (DBMS) with knowledge of concepts and practices covering major DB approaches (ex. CODASYL, IMS) and IMS internals, RACE, CICS or other TPM's.
- Systems analysis experience with financial/accounting applications (MBA or CPA desirable) and implementation of data base management systems.

If you are interested in an opportunity to join a world leader in information processing services, send your resume and salary history in confidence to **Paula B. Wiltrout, Ref. 48N, General Electric Information Services Company, 401 N. Washington Street, Rockville, MD 20850. (301) 340-5744.**

GENERAL ELECTRIC

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EDP OPPORTUNITIES

PROJ Mgr 370/138 AR	$35K
SOFTWARE VS1	$39K
SOFTWARE MVS 4341	$40K
PROJ LDR - Medical diagnostics, micro	$39K
IMS D/B Analyst DL 1	$37-40K
IMS Analyst 3033	$38K
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SOFTWARE NCT 3705 advanced technol	$38K
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Positions located in New York City, New Jersey, Connecticut as well as internationally

Call Bill Borrelli (212) 349-3610

WM HARRIS ASSOCIATES
150 Broadway, NY, NY 10038 (agency)

ADRIAN COLLEGE COMPUTER CENTER DIRECTOR

Adrian College seeks a Director to develop the College Computing Center. The Center services the instruction, research and administrative needs of the college and the Director oversees all phases of this work. Areas of responsibility include liaison with faculty and students regarding their computer needs and with the college administrators regarding their aspect of computer usage. Requirements for the position include knowledge of system analysis, application programming, and instructional computing. The position offers an excellent opportunity to organize and develop the Computer Center. The college recently purchased a DEC PDP-1134 with RSTS/E to meet the campus-wide computer needs. Salary competitive and commensurate with qualifications and experience. Send letters of application and nominations with vitae to **Thomas E. Williams, Associate to the Vice President for Academic Affairs, Adrian College, Adrian, MI 49221.** An Equal Opportunity Employer.

Programmers & Analysts

Rogers and Associates is a leading data processing consultant firm. Due to continued expansion, we seek highly motivated individuals with strong backgrounds in programming or system analysis. Successful applicants will possess outstanding interpersonal and communication skills.

Openings exist in our U.S. offices at San Francisco, Los Angeles, Seattle, Portland, and our Canadian offices in Edmonton, Calgary, Regina, Vancouver and Victoria. Individuals should have at least two years of experience with business applications using any of the following:

- **COBOL, PL/1, RPG II, BASIC-PLUS, MARK IV**
- **IBM 370 Series; OS, VS; TSO/SPF; IMS, CICS**
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- **DEC 11 Series; TOPS, RSTS/E; CCL, DBMS, RMS**
- **HP 3000; IMAGE, QUERY**

Rogers and Associates offers an attractive salary and benefit program as well as planned personal development opportunities. If you possess the necessary skills and desire to pursue a career in consulting, we would be pleased to discuss your career plans in more detail.

Please reply in confidence to: Mr. Craig Colllu

ROGERS & ASSOCIATES

Management Consultants Ltd.
4355 99th Street
Edmonton, Alberta T6E 5E4

2500 Wilshire Blvd.
Suite 712
Los Angeles, CA 90057

Engineering

CONTROL SYSTEMS ENGINEER

Located just minutes from downtown Denver and within easy driving distance of the Rocky Mountains, Tri-State, a $550 million dollar electric utility cooperative has an immediate need for a Control Systems Engineer. This Position will be involved in the development, testing, integration and maintenance of the software and data base associated with the Energy Management System (SCADA). Qualified candidates should possess a B.S. degree in Computer Science, Electrical Engineering, Mathematics or related field and three years programming experience to include knowledge of real-time systems and FORTRAN. Some travel required.

Tri-State offers a competitive salary, excellent fringe benefits and paid relocation. Interested applicants should submit a resume with salary history to:

TRI-STATE GENERATION & TRANSMISSION ASSN., INC.
Personnel Dept. CW
P.O. Box 33695
Denver, CO 80233

An Affirmative Action/Equal Opportunity Employer

TRI-STATE
GENERATION & TRANSMISSION ASSOCIATION INCORPORATED

INFORMATION SYSTEMS MANAGER
ANCHORAGE ALASKA

Medium sized Property/Casualty insurer has excellent position for a take-charge individual. Requires 5 years' data processing experience, to manage a small staff and DP installation in our ANCHORAGE Regional office. Degree preferred; could be offset by relevant work experience. Insurance background a plus, but not essential.

Candidates must have ability to implement new systems and equipment. Position offers excellent compensation, benefits and relocation reimbursement.

For confidential interview please send your resume (current salary and salary expectations are required for consideration) or call **Ms. B.H. Proctor, Director of Human Resources, collect: 401-831-4000.**

Providence Washington Insurance Company
20 WASHINGTON PLACE, PROVIDENCE, RI 02903

equal opportunity employer, M/F

IMPORTANT THINGS ARE HAPPENING QUICKLY AT

Zayre Corp.!

We are a major Fortune 500 retailer with Corporate Headquarters located in Framingham, Massachusetts (15 minutes west of Boston) and are seeking career oriented individuals to join our rapidly expanding Data Processing Division.

If you are looking for stimulating projects with professional visibility in a growing and dynamic environment, we offer the folowing opportunities:

- SENIOR SOFTWARE SPECIALIST
- DATA BASE ADMINISTRATOR
- BUSINESS SYSTEMS ANALYST
- PROGRAMMER/ANALYST

A wide variety of computer hardware is currently in place, including an IBM 370/168 attached processor and a Distributed Processing Network which includes more than 100 CPU's and over 1500 EPOS terminals.

Excellent benefits and competitive salaries are all a part of the package when you join our team. Send your resume, in confidence, to:

Zayre

EDP RECRUITMENT
Home Office Personnel
Zayre Corp.
Speen Street
Framingham,
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Equal Opportunity Employer
M/F

S.W.I.F.T.

SOCIETY FOR WORLDWIDE INTERBANK FINANCIAL TELECOMMUNICATION

International organization has opened a telecommunications data center in Culpeper Va. Burroughs equipment is used in a Real Time message switching environment. Company offers generous benefit package and relocation expenses.

COMMUNICATIONS PROGRAMMER ANALYST

(4 positions)

Be a member of a team involved in -
- Evaluation and enhancement of software for an international three switch network.
- Analysis of current and planned for network usage.
- Developing data communications specifications.
- Testing, installation and debugging communications software.

One to five years experience in data communications required with exposure to operating systems and assembler language.

All positions fee paid. For immediate confidential interview call:

Joseph R. Batts - Exclusive Recruiting Agent
Management Recruiters of Arlington, Inc.
703/841-1700
1901 N. Moore St. #511
Arlington, VA 22209

EDP AUDITORS

Tandy Corporation is a Fortune 500 leader with annual sales in excess of $1 Billion. Our dynamic growth has created immediate openings for experienced EDP auditors with a thorough knowledge of auditing techniques, systems and programming to join our EDP auditing group. The ideal candidates should have 2-4 years previous experience in EDP auditing. One to three years experience in data processing systems and programming will be a plus.

This challenging assignment involves the appraisal of internal controls, audit of new systems development and review of Data Processing installations. High standards of performance are expected with the ability to communicate effectively at all management levels, both orally and in writing. Starting salary range is $18,000-$24,000. Full benefits package includes Stock Purchase and Savings Investment Programs with up to 80% matching company contributions.

Please send resume indicating experience, educational accomplishments and salary history in complete confidence to:

J.J. Mintz
Employment Manager
Personnel Division
Tandy Corporation
500 One Tandy Center
Fort Worth, Tex. 76102
An Equal Opportunity Employer

Have you heard about

TECHNICON

on the San Francisco Peninsula

Important things are happening HERE!

- **TECHNICON is the leader in the field of medical information systems.**
- **TECHNICON is looking for Programmers who are interested in improving the quality of health care delivery.**
- **TECHNICON offers a small company atmosphere; a large machine on-line programming environment and a commitment to professional growth.**

Sr. Applications Programmers

We seek individuals with a proven track record and the willingness and ability to assume a lead programmer role. Positions require experience in a large system 370 ALC environment. Familiarity with DBMS design issues is desirable.

DOS/VS Systems Programmer

Challenge yourself with this newly created position as a Systems Programmer. you will work with our applications programming specialists and our data center staff in the investigation, planning & installation of new IBM hardware & software and new TECHNICON software. Position requires 3-5 years experience with DOS/VS system programming & maintenance. Knowledge of Power/VS, RJE, DOS/VS Sysgen, ALC & your good communications skills are essential; exposure to COBOL & VM 370 desirable. Leadership and problem solving abilities are key to this opportunity.

COBOL Programmer

You will perform programming functions in our patient accounting department. Position requires 3 years COBOL programming exp. degree or equiv. training, experience with hospital systems patient accounting and familiarity with DBMS design issues preferred.

Operations Supervisor

We offer a challenging opportunity to a DP Professional to assume responsibility for the planning, coordination and control of our computer center operations area. You will direct 3 shifts (16 operators), running our two 370/155's and our 370/158 under DOS/VS, VM and DOS/VSE. Position requires effective planning and leadership skills coupled with background in a multi-vendor shop.

Hardware Engineers

You will be responsible for developing hardware specifications for equipment used in the medical information system. You will also evaluate and provide hardware design for external sources & provide technical assistance for new & existing customer contracts. Position requires experience in hardware digital circuitry design and system integration of computer equipment. Your ability to document procurement specifications and technical descriptions and interface with outside vendors necessary.

Systems Analyst

You will be responsible for the analysis and design of enhancements to our patient billing and accounts receivable system. Position requires BS degree or equiv., 2 years related experience and knowledge of accounting. Familiarity with hospital accounting systems, especially patient billing and accounts receivable is preferred.

TECHNICON
Medical Information
Systems Corp.

Be where important things are happening . . . check into TECHNICON, a company with long-term, stable growth, competitive salaries and most comprehensive benefits. Please send resume, including salary history, or contact Rita Olds in our Personnel Department, at TECHNICON, 3255-1 Scott Blvd., Santa Clara, CA 95051. 408/727-9400. An equal opportunity employer. Individuals only apply.

SOFTWARE DEVELOPMENT SPECIALISTS POINT-OF-SALE TERMINALS

Microprocessor Systems

The rapid growth of Sweda International continues to create new opportunities for software development specialists at our corporate headquarters in Morris County, New jersey. We are located in an attractive suburban location, yet within a 30-minute ride to the theaters, museums and culture which only NYC has to offer. You can join this respected leader in the Electronic Cash Register and Point-of-Sale field, if you meet these qualifications.

- **Design experience in microprocessor Assembly language.**
- **Data communications and POS applications experience desirable.**

Your responsibilities will include the design and implementation of software for our future Point-of-Sale projects.

We offer an excellent salary, outstanding benefits including relocation costs, plus a solid professional atmosphere. For immediate consideration, please send your resume, including salary history in confidence to: Director of Recruitment, SWEDA INTERNATIONAL, INC., 34-A Maple Avenue, Pine Brook, New Jersey 07058.

Litton SWEDA INTERNATIONAL, INC.

Equal Opportunity Employer M/F

COMPUTER PROGRAMMERS

WOLVERINE WORLD WIDE, maker of world famous HUSH PUPPIES shoes, has openings in our Corporate Information Services Dept. for experienced Computer Programmers.

The successful candidates will have 1-2 years programming experience, with emphasis in COBOL on Burroughs equipment an added plus

This is a growth position with an expanding consumer goods company located in Rockford, Michigan. Beautiful Western Michigan offers year-round vacation and recreational facilities: swimming in Lake Michigan, excellent fishing and hunting, skiing and snowmobiling. Located just 20 minutes north of Grand Rapids, Michigan, Rockford offers a good school system and access to all metropolitan conveniences, with a small town atmosphere.

We offer a competitive salary and fringe benefits package with paid relocation expenses.

If you are interested in a position that offers real growth and excellent opportunity for advancement, send resume detailing salary history and requirements in confidence to:

Robert J. Pruim
Employment Manager
WOLVERINE
WORLD WIDE, INC.
Rockford, Michigan 49351
Equal Opportunity Employer M/F

COMPUTER INDUSTRY

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P/A-COBOL+/or NEAT 3	$20K
P/A-RPG II Sys 3	$23K
PROG-3+ yrs-COBOL-CICS+	$25K
SR ANALYST-IMS-	$25K
SYS PROG-Heavy CICS	$28K
S/A-Degree-Financial	$30K

ROBERT HALF
of Louisiana, Inc.
135 St. Charles Ave.
New Orleans, LA 70130
(504)524-3773

MANUFACTURING SYSTEMS RSTS/E PROGRAMMER

We have an opening for a Programmer in our manufacturing systems area working with our PDP-11/70 RSTS/E system. The candidate should have a BS in Math or Computer Science, with actual programming experience helpful. Duties will include designing, coding, testing, and documenting programs and systems, working closely with the users of such systems as: Bill of Material; Inventory Management; and Manufacturing Control. A heavy emphasis is placed on interactive program techniques using DEC's BASIC-plus programming language, with some use of FORTRAN, BASIC-plus II, and Datatrieve.

We offer commensurate salary, comprehensive benefit and the opportunity to make the kind of visible contributions that lead to recognition and growth in a small company atmosphere. Send resume including salary history to:

Mr. Bill Stephan
P.O. Box 1123 Dayton, Ohio 45401

CHEMINEER, INC.

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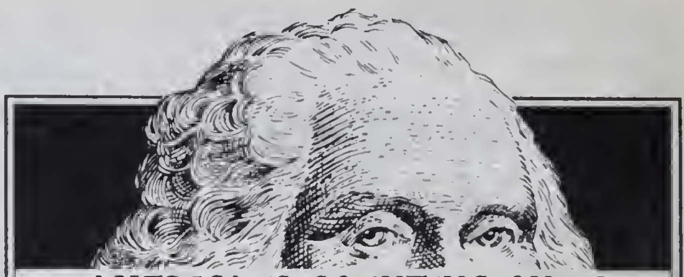
Programmer Analyst

Project leader for analysis and design or modification of administrative and/or academic systems. Bachelor's degree preferred. Burrough's hardware/software experience desirable. Salary up to $20,000/yr. Excellent fringe benefits. **For info/application write before April 11, 1980 to: Mr. Stanley Pyc, Director of Computer Services, SUNY Ag. & Tech College, Cobleskill, NY 12043.** EO/AA Employer.

New Anticipated MVS Communications Analyst

Qualifications: Bachelor's degree or higher in Computer Science or related field in Data Processing Telecommunications. Preference given to applicants having experience with teleprocessing. Position to supervise the physical communications at the System Network Computer Center. Send confidential resume to: **Dr. John M. Tyler, System Network Computer Center, Louisiana State University, Baton Rouge, Louisiana 70803.** An Equal Opportunity/Affirmative Action Employer.



AMERICA IS COUNTING ON US

At SERI, we're committed to making Solar Energy a useful alternative energy source for America. And we're counting on dedicated professionals like you to help us achieve our goals. We are currently seeking the following individuals:

COMPUTER SCIENTISTS

DATA BASE COMPUTER SCIENTISTS

The position requires a background in database administration and programming. Involves software development in support of the Solar Energy Information Data Bank and related database administration functions. An M.S. in Computer Science, Math or equivalent with at least five years experience in application programming (Fortran or PL/1) required. Competence in IBM OS/JCL, IBM Utilities and at least one DBMS (INQUIRE or ADABAS) preferred.

COMPUTER SCIENTIST

We are seeking an application programmer with a background in econometrics, operations research, or statistics. Project management desired. An M.S. or equivalent in computer science, operations research, math, or social science with approximately five years experience in general purpose programming required. Competence in Fortran with experience in economics/environmental applications preferred.

COMPUTER SCIENTIST

We need an applications programmer to support solar simulation models, scientific data management, and general information storage and retrieval. An M.S. or equivalent in computer science, math, or related field with approximately five years experience in general purpose programming required. Competence in Fortran, Cobol, and database experience helpful.

TECHNICIAN II

You will operate computer consoles, enter data and files, maintain records, perform procedures for system backup as well as observe systems to determine whether programs are operating correctly. A high school degree or equivalent with two years experience on large scale computer systems operations required. Operation experience with CDC Cyber 170 and Cyber 70/76 with RJE systems preferred.

DATA BASE DESIGN & DEVELOPMENT

You will be responsible for the creation and implementation of non-bibliographic and numeric data bases for the Solar Energy Information Data Bank.

SENIOR LEVEL

Masters degree in Library, Computer or Information Science or equivalent with 6 years experience, including supervision and data base development work required.

STAFF LEVEL

Masters or equivalent with 3 years experience or Bachelors with 4 years required. Experience must include data base development work.

Send your resume, including salary history and professional references (no phone calls) to: **SOLAR ENERGY RESEARCH INSTITUTE, Dept. R-ARKH, Personnel Services, 1617 Cole Boulevard, Golden, Colorado 80401.** We are an equal opportunity employer M/F/H/V. A DOE Contractor.

A division of the Midwest Research Institute

SERI

PROGRAMMER ANALYST

Vermont

Honeywell 66/60 DM-IV. Minimum 4 years' experience including COBOL 74, data base, communications, and CRT applications. Easy coder background preferred but not necessary. Large New England Motor Freight Common Carrier with on-line system since 1973 offers professional challenge and Vermont quality of life. Excellent compensation package. Contact Dave Lavigne, Director of EDP.

(802) 748-8131

ST. JOHNSBURY
TRUCKING COMPANY, INC.
38 Main Street
St. Johnsbury, VT 05819
Equal Opportunity Employer

DATA COMMUNICATIONS ANALYSTS

Pacific Northwest

Weyerhaeuser Company, world leading forest products and Fortune 500 company, has several highly challenging positions for:

NETWORK CONTROL DATA COMMUNICATIONS TECHNICAL ANALYSTS AND SENIOR ANALYSTS

You will have responsibility for identifying and resolving complex data communications operational problems with the aid of sophisticated test equipment in a large-scale, centralized, network control facility. Your background must include 5-10 years' experience with:

- **Communications network hardware such as computer front ends, port selectors, statistical TOM's, terminal controllers, intelligent terminals, analog and digital patching, and modems.**
- **Asynchronous and synchronous data communications techniques, circuit controls, and line protocols such as BISYAC and SDLC.**
- **Basic computer operations and concepts.**

If you meet these qualifications, submit your resume to **Peter Garlock, Telecommunications Operations Manager, Dept. E-232, Weyerhaeuser Company, Tacoma, Washington 98477.** An equal opportunity employer m/f.

Weyerhaeuser Company

Job Opportunities Are Waiting For You In The Sunny Southwest!

Arizona Public Service Company is in the process of expanding our EDP department to provide state-of-the-art computer support for business, engineering, scientific and special purpose applications. Excellent opportunities exist for qualified people in the following positions:

Programmer Analyst

To work in financial accounting, inventory management, customer information, project accounting, payroll personnel, and other supporting business applications.

Systems Programmer

Large 370/168 Installation running MVS 3.7, JES 2, IMS/VS 1.1.5, TSO with SPF via state wide privately owned T/P network.

System Engineer

For analytical and scientific application, design and development for engineering and operation.

Energy Management System Engineer

For real-time operating systems interrupt processing SCADA, man-machine Interface and advanced power system applications. Prefer experience with assembly language, Leeds and Northrup LN-550 or IBM 370.

All of the above positions require a BS degree in engineering, math, physics, or computer science with a minimum of 2 years experience, preferably with IBM 370/168.

We offer an excellent salary, benefits and promotional opportunities in addition to the casual lifestyle of the Southwest. Please send detailed resume to: **Bryan Turgesen.**

aps.
ARIZONA PUBLIC SERVICE CO.

Station 1102-CW
PO Box 21666
Phoenix, AZ 85036

An Equal Opportunity Employer M/F

CHECK US OUT FOR YOURSELF.

LA Interviews Tuesday, Wednesday and Thursday; April 8, 9, and 10.

If you are a *Programmer Analyst,* with two years' experience, a thorough knowledge of COBOL and have some exposure to an IBM environment . . . or if you are a seasoned *MVS Systems Programmer* possessing thorough knowledge of OS/MVS Internals, sysgens, dump analysis, and JES-2 . . . you could qualify for a job opportunity that offers:

- ☐ Living in the San Francisco Bay Area.
- ☐ Generous relocation allowance.
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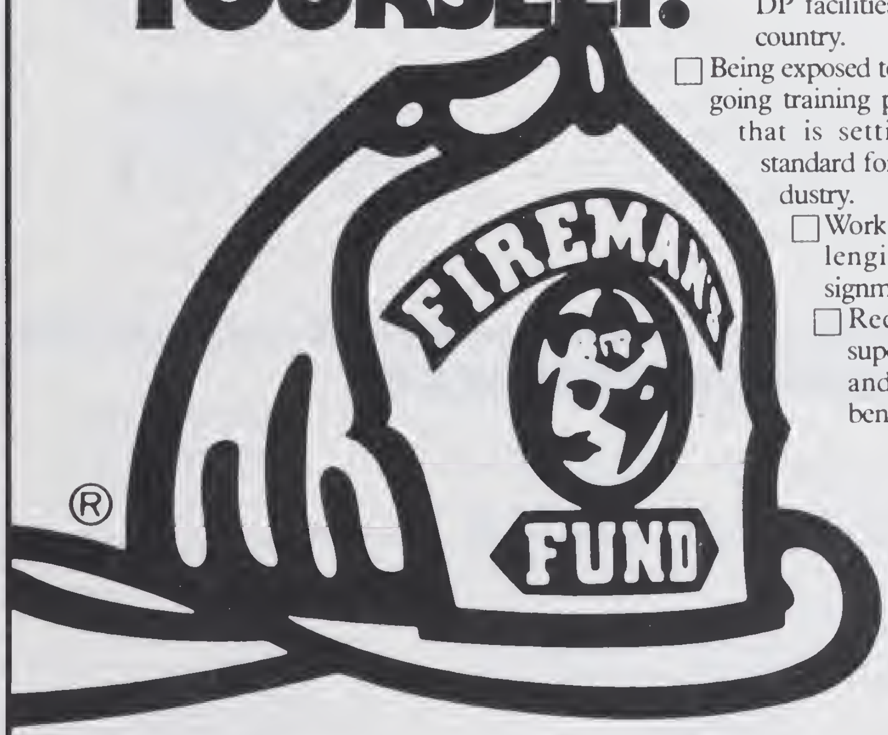

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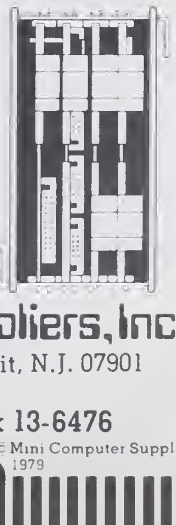

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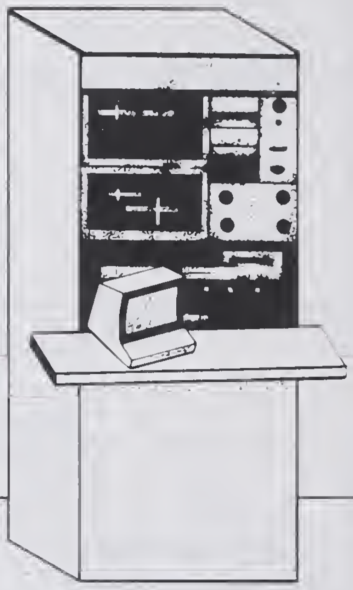

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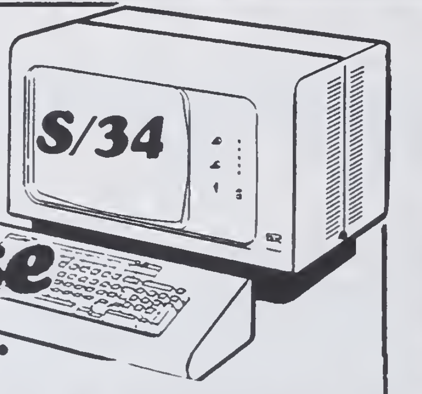

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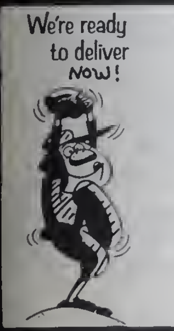
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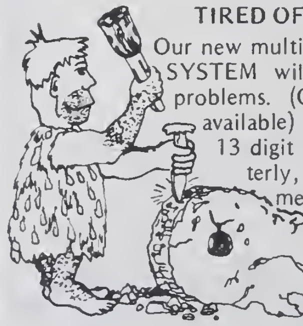

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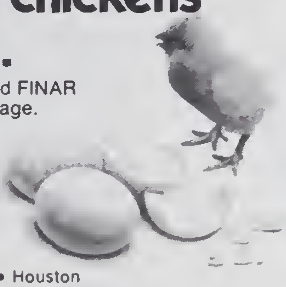

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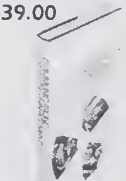

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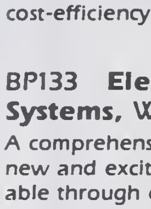

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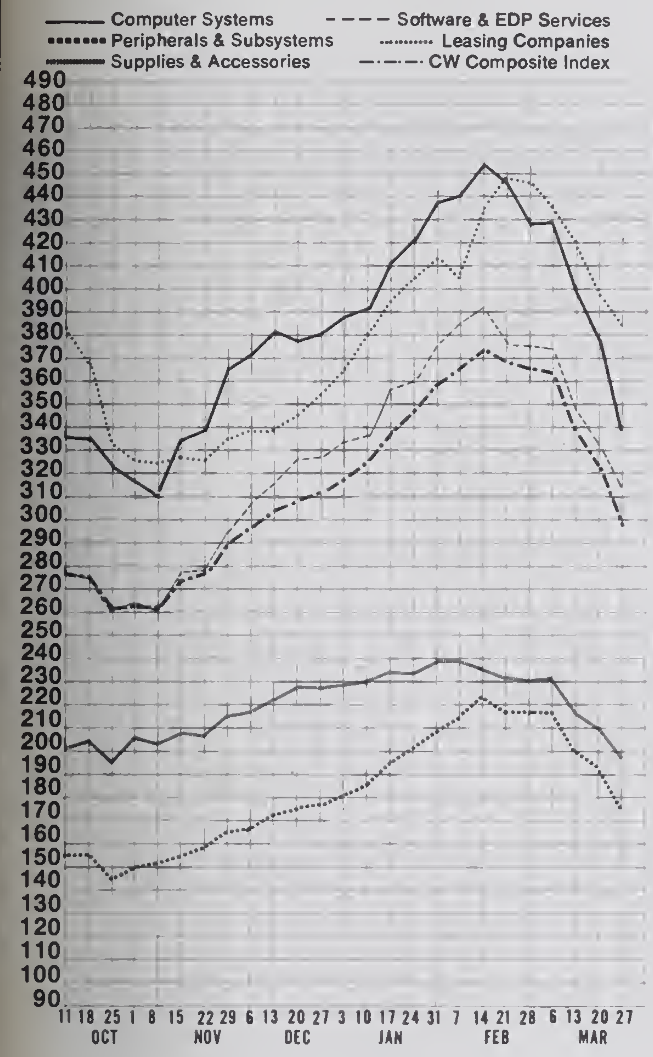

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TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, MARCH 26, 1980

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
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COMPUTER SYSTEMS

EXCH		PRICE 1979-80 RANGE (1)	CLOSE MAR 26 1980	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	17- 69	17 1/2	-3 3/8	-16.1
N	BURROUGHS CORP	59- 87	63 1/2	- 7/8	-1.3
O	COMPUTER AUTOMATION	9- 44	13	-4 3/4	-26.7
N	CONTROL DATA CORP	23- 61	44 1/2	-4 1/8	-8.4
O	CRAY RESEARCH INC	8- 58	41	-3 1/2	-7.8
N	DATA GENERAL CORP	42- 74	58	-3 1/4	-5.3
N	DATAPOINT CORP	34-123	98	-6 1/8	-5.8
N	DIGITAL EQUIPMENT	39- 80	59 1/4	-3 3/4	-5.9
N	ELECTRONIC ASSOC.	2- 13	7 1/8	- 7/8	-10.9
A	ELECTRONIC ENGINEER.	9- 19	13 1/8	- 3/4	-5.4
N	FOUR-PHASE SYSTEMS	19- 47	28 1/2	-4 1/8	-12.6
N	FOXBORO	28- 44	32	-1 3/8	-4.1
O	GENERAL AUTOMATION	7- 26	11 1/4	-1 5/8	-12.6
O	GRI COMPUTER CORP	1- 3	1/2	- 1/8	-20.0
N	HEWLETT-PACKARD CO	24- 70	59 7/8	-3	-4.7
N	HONEYWELL INC	43-100	72	-9 3/4	-11.9
N	IBM	53-321	53	-5 7/8	-9.9
N	MANAGEMENT ASSIST	9- 29	11 5/8	-2 1/8	-15.4
O	MANUFACTURING DATA S	9- 38	28 1/4	+ 1/2	+1.8
O	MINI-COMPUTER SYST	2- 8	2 5/8	- 1/2	-16.0
O	MODULAR COMPUTER SYS	7- 18	10 1/4	-1 5/8	-13.6
N	NCR	37- 81	56 1/2	-11 1/8	-16.4
N	PRIME COMPUTER INC	9- 32	23 5/8	-5	-17.4
N	PERKIN-ELMER	17- 47	37 1/8	-2 1/4	-5.7
N	SPERRY RAND	33- 60	47	-2 7/8	-5.7
A	SYSTEMS ENG. LABS	11- 24	14	-2 1/2	-15.1
O	TANDEM COMPUTERS INC	13- 54	38 3/4	-3 3/4	-8.8
N	TEXAS INSTRUMENTS	78-108	82 3/8	-3 5/8	-4.2
A	WANG LABS.	6- 40	29 3/8	-5 1/4	-15.1

LEASING COMPANIES

EXCH		PRICE 1979-80 RANGE (1)	CLOSE MAR 26 1980	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE FINANCIAL CP	13- 21	15 1/2	- 3/4	-4.6
O	COMDISCO INC	3- 21	7	-3	-30.0
A	COMMERCE GROUP CORP	1- 2	2 5/8	+ 7/8	+50.0
A	COMPUTER INVSTRS GRP	1- 7	2 1/8	- 1/8	-5.5
O	CONTINENTAL INFO SYS	3- 15	2 1/2	0	0.0
M	DATRONIC RENTAL	1- 4	2 3/8	- 1/4	-9.5
A	DCL INC	3- 6	5 1/4	0	0.0
N	DPF INC	6- 14	5 3/4	- 1/2	-8.0
N	ITEL	2- 36	2 1/8	-1	-32.0
N	LEASCO CORP	24- 73	62 3/4	+1 1/8	+1.8
O	LEASPAC CORP	1- 4	1/8	0	0.0
A	PIONEER TEX CORP	2- 7	2 5/8	- 1/4	-8.6
N	U.S. LEASING	12- 20	12 1/2	- 1/4	-1.9

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SOFTWARE & EDP SERVICES

EXCH		PRICE 1979-80 RANGE (1)	CLOSE MAR 26 1980	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	2 1/4	+ 3/4	+50.0
O	ANACOMP INC	8- 24	12 1/4	-1 1/2	-10.9
O	ANALYSTS INTL CORP	3- 6	4 1/4	- 1/2	-10.5
A	APPLIED DATA RES.	8- 17	8 3/4	-1	-10.2
N	AUTOMATIC DATA PROC	24- 40	34	0	0.0
O	COMPU-SERV NETWORK	5- 19	17 1/4	- 7/8	-4.8
O	COMPUTER HORIZONS	1- 9	3 1/2	- 1/4	-6.6
O	COMPUTER NETWORK	4- 16	4 1/4	- 5/8	-12.8
N	COMPUTER SCIENCES	8- 24	16 7/8	-2	-10.5
O	COMPUTER TASK GROUP	1- 9	7 1/4	0	0.0
O	COMPUTER USAGE	2- 5	3	+ 1/8	+4.3
O	COMPUT AUTO REP SVC	4- 10	5	0	0.0
O	COMSHARE	6- 26	14	-1 1/2	-9.6
O	CULLINANE CORP	14- 34	28	-3	-9.6
O	DATA DIMENSIONS INC	1- 9	1 1/4	- 1/4	-16.6
O	DATATAB	1- 4	5/8	- 1/4	-28.5
O	DSI CORP	4- 9	6 1/4	- 1/4	-3.8
N	ELECTRONIC DATA SYST	15- 28	20 1/4	- 3/8	-1.8
O	INFORMATICS INC	9- 22	12 1/2	-2 1/4	-15.2
O	INSYTE CORP	1- 3	1 3/8	0	0.0
O	IPS COMPUTER MARKET.	2- 4	3	- 1/2	-14.2
O	KEANE ASSOCIATES	3- 9	8	- 1/2	-5.8
O	KEYDATA CORP	1- 5	2 1/8	- 3/8	-15.0
A	LOGICON	10- 23	17 1/8	- 3/4	-4.1
O	NATIONAL DATA CORP	7- 19	15 1/4	-1	-6.1
N	PLANNING RESEARCH	4- 10	5 3/4	- 3/4	-11.5
O	PROGRAMMED TAX SYSTS	3- 5	4 1/2	- 1/4	-5.2
O	PROGRAMMING & SYS	1- 1	3/4	0	0.0
O	RAPIDATA INC	3- 7	4 1/4	- 3/4	-15.0
O	REYNOLDS & REYNOLD	18- 36	27 1/4	- 1/2	-1.8
O	SCIENTIFIC COMPUTERS	3- 16	11 1/4	- 1/4	-2.1
N	TYMSHARE INC	18- 58	44 7/8	-2 5/8	-5.5
A	URS SYSTEMS	5- 12	10	+ 1/4	+2.5
N	WYLY CORP	1- 9	7 5/8	- 1/4	-3.1

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1979-80 RANGE (1)	CLOSE MAR 26 1980	WEEK NET CHNGE	WEEK PCT CHNGE
N	AM INTERNATIONAL	13- 32	16	-2 3/4	-14.6
N	AMPEX CORP	10- 29	22 3/4	-2 1/8	-8.5
A	ANDERSON JACOBSON	5- 16	10	-1 3/4	-14.8
N	APPLIED DIG DATA SYS	6- 22	5 7/8	-1 1/4	-17.5
O	AUTO-TROL TECHNOLOGY	14- 39	29	-2 3/4	-8.6
O	BEEHIVE INT'L	3- 8	5 1/4	- 3/4	-12.5
A	BOLT.BERANEK & NEW	6- 22	15 3/8	-1 1/4	-7.5
N	BUNKER-RAMO	10- 32	20 5/8	-3 7/8	-15.8
O	CAMBRIDGE MEMORIES	1- 9	1 5/8	- 1/8	-7.1
O	COMPUTER DEVICES INC	5- 9	5 1/2	- 3/4	-12.0
N	CENTRONICS DATA COMP	16- 54	23 7/8	-12 1/2	-34.3
O	COGNITRONICS	1- 4	2 1/2	- 1/8	-4.7
O	COMPUTER COMMUN.	6- 10	3 5/8	- 5/8	-14.7
O	COMPUTER CONSOLES	4- 29	21 1/2	-2 1/2	-10.4
A	COMPUTER EQUIPMENT	3- 7	5 3/8	- 7/8	-14.0
O	COMPUTER TRANSCEIVER	1- 5	2 3/8	- 1/8	-5.0
O	COMPUTERVISION CORP	5- 58	42 3/8	-7 3/8	-14.8
N	CONRAC CORP	13- 26	16 1/8	-2 1/2	-13.4
A	DATA ACCESS SYSTEMS	0- 14	9 1/2	- 3/4	-7.3
A	DATA PRODUCTS CORP	13- 25	12 7/8	-3 3/8	-20.7
O	DATUM INC	2- 6	2 1/4	- 1/4	-10.0
O	DECISION DATA COMPUT	2- 6	1 3/4	- 1/2	-22.2
O	DELTA DATA SYSTEMS	1- 3	2 1/8	- 3/8	-15.0
N	DOCUMATION INC	6- 34	8 5/8	-2 7/8	-25.0
O	DATARAM CORP	6- 36	31 3/4	+4 1/4	+15.4
N	ELECTRONIC M & M	3- 9	4 1/8	- 1/2	-10.8
O	EVANS & SUTHERLAND	20- 52	46 1/2	-3 1/2	-7.0
O	FABRI-TEK	1- 2	1 7/8	0	0.0
O	GENERAL COMPUTER SYS	1- 3	2 1/4	0	0.0
O	GENERAL DATACOMM IND	9- 24	13	-1 1/4	-8.7
N	HAZELTINE CORP	10- 29	20 3/8	-2 7/8	-12.3
N	HARRIS CORP	17- 39	29 7/8	-2	-6.2
O	INFOREX INC	1- 11	1 3/8	+ 1/8	+10.0
O	INFORMATION INTL INC	7- 15	10 1/2	- 3/4	-6.6
O	INFOTON	1- 4	2 3/8	- 1/4	-9.5
O	INTEL CORP	26- 75	59 1/2	-4	-6.2
O	INTERSIL	7- 32	17 3/8	-5 5/8	-24.4
A	LUNDY ELECTRONICS	4- 11	7 7/8	- 1/8	-1.5
O	MSI DATA CORP	6- 19	6	- 5/8	-9.4
N	MEMOREX	11- 59	11 1/8	-2 1/2	-18.3
N	MOHAWK DATA SCI	6- 20	12 3/4	-2 1/2	-16.3
O	OMEX	2- 10	10	0	0.0
O	PARADYNE CORP	9- 36	27 1/4	-3 3/8	-11.0
A	PENRIL CORP	5- 15	9 1/2	-1 1/8	-10.5
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	RAMTEK CORP	7- 17	12 3/4	-2	-13.5
O	RECOGNITION EQUIP	5- 13	6 1/8	- 5/8	-9.2
O	SCAN DATA	1- 5	1 3/4	0	0.0
N	STORAGE TECHNOLOGY	14- 46	13 5/8	-1 1/4	-8.4
O	SYKES DATATRONICS	4- 31	17 3/4	+1 1/2	+9.2
O	T BAR INC	11- 28	20 1/4	-2 3/4	-11.9
A	TEC INC	4- 13	3 7/8	- 1/2	-11.4
N	TEKTRONIX INC	33- 64	45 7/8	-1	-2.1
N	TELEX	3- 9	3	- 1/4	-7.6
O	TESDATA SYSTEMS CP	8- 26	10 1/8	-2 1/4	-18.1
O	TIMEPLEX INC	4- 14	10	- 3/8	-3.6
O	WILTEK INC	1- 2	1 3/8	+ 1/8	+10.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1979-80 RANGE (1)	CLOSE MAR 26 1980	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	6- 12	8	-1 1/2	-15.7
O	BALTIMORE BUS FORMS	1- 4	3/4	- 1/4	-25.0
N	BARRY WRIGHT	14- 34	21 3/8	- 3/8	-1.7
O	CYBERMATICS INC	1- 1	7/8	0	0.0
O	DUPLEX PRODUCTS INC	13- 31	22 3/4	- 5/8	-2.6
N	ENNIS BUS. FORMS	5- 21	14 1/2	+ 1/8	+0.8
N	3M COMPANY	43- 66	47 5/8	- 1/2	-1.0
O	MOORE CORP LTD	26- 34	27 1/4	-1 1/4	-4.3
N	NASHUA CORP	18- 37	21 1/8	- 7/8	-3.9
O	STANDARD REGISTER	20- 29	23 1/2	- 1/2	-2.0
A	TAB PRODUCTS CO	8- 22	17 1/8	-2 1/8	-11.0
A	WABASH MAGNETICS	10- 22	12	-1	-7.6
N	WALLACE BUS FORMS	18- 33	24 5/8	- 3/8	-1.5

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2. The M-200. This Impact Matrix printer provides 200 lpm for the same price as 165-180 cps printers. Excellent for small micro-based systems, such as DEC LSI-11, and distributive processing applications such as Burroughs Poll and Select.

3. The CT-1200 Family. ChainTrain printers provide superior flexibility in forms and exquisite print quality right through to the last of six-part copies. Excellent for high-speed output on systems such as DECsystem 10 and 20. Speeds are 600, 1000 and 1200 lpm.

4. The B-300/B-600. SSI's 300 and 600 lpm Band printer systems are the latest impact technology. Low-cost and easy to maintain, the Band is a user's economical answer to increased output. PDP-11 and NOVA 4 users particularly are turning to the Band.

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___ The B-300/B-600 (low cost bands)
___ The 2550 (1500 lpm Charaband)
___ The 2200 Family (300, 600, 900 lpm drum)
___ CT-1200 Family (600, 1000, 1200 lpm ChainTrain)

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